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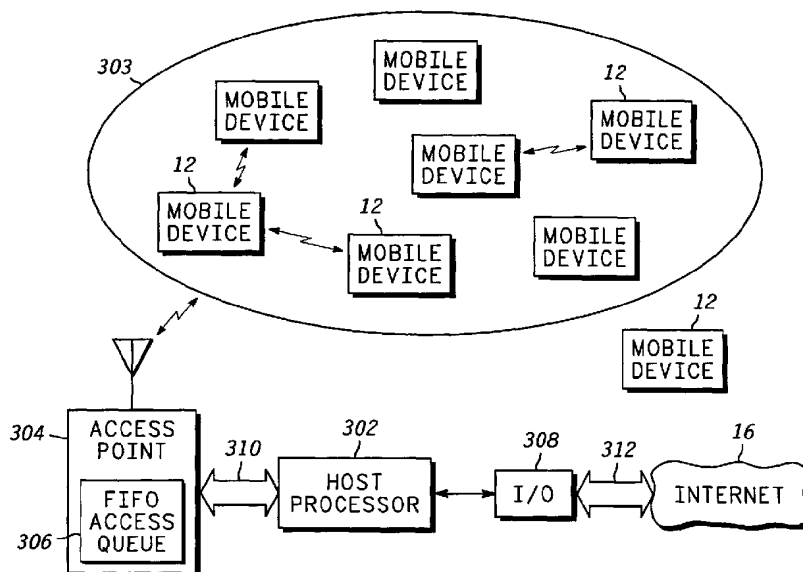
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(54) Title: A COMMUNICATION SYSTEM THAT PROVIDES ACCESS QUEUING FOR COMMUNICATION SERVICES



(57) Abstract: A communication system (10) provides access to communication services used by a plurality mobile devices (12). A host processor (302) manages wireless service access to the mobile devices (12) over one or more communication links. A link manager (202) manages the one or more links in response to commands from the host processor (302). The system (10) includes an access queue (306) that queues service access requests from a group of mobile devices (12). The host processor (302) grants and terminates service access to the mobile devices in the group of mobile devices based on a predefined access policy that, for example, corresponds to the attributes of a service type and/or a subscription to the service by a user.

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A Communication System that Provides Access Queuing For Communication Services

Field of the Invention

In general, the present invention relates to the field of communication systems, more particularly, to communication systems that provide communication services to mobile devices.

Background of the Invention

Communication systems that provide services over wireless links are known. One such system is specified by Bluetooth that supports both asynchronous and synchronous services, where the services are offered to the mobile devices over point-to-point or point-to-multipoint communication links. Under Bluetooth specification, a Service Discovery Protocol (SDP) defines the procedure for locating available services provided by or available through the system. More specifically, SDP provides the means for client applications, which may be running on the mobile devices, to discover the existence of services provided by server applications as well as the attributes of those services. The attributes of a service include the type or class of service offered and the mechanism or protocol information needed to utilize the service.

In order to provide point-to-point or point-to-multipoint communication links, Bluetooth uses a combination of circuit and packet switching. A point-to-point link is shared between only two Bluetooth-enabled mobile devices, whereas a point-to-multipoint link is shared among several mobile devices. Bluetooth can support one asynchronous data channel, up to three simultaneous synchronous voice channels, or a channel that simultaneously supports asynchronous data and synchronous voice.

Under the Bluetooth specification, two or more mobile devices that share the same channel form a piconet, and multiple piconets with overlapping coverage areas form a scatternet. One mobile device acts as the master device of the piconet, whereas the other mobile device(s) acts as slave device(s). Thus, each piconet can only have a single master device. However, slave devices can participate in different piconets on a time-division

multiplex basis. In addition, a master device in one piconet can be a slave device in another piconet.

Communication resources of the Bluetooth system can support up to seven active slave devices in a piconet. At times, however, the number of Bluetooth mobile devices requesting access to system services may exceed the available communication resources of the system. Sharing communication resources, such as radio frequency channels or bus bandwidth, amongst a number devices, e.g., processing units, is known. Fairness rules have been applied to share communication bus bandwidth amongst multiple processors for transfer of data. Also known are conventional multi-tasking computer systems that share limited resources amongst a plurality of applications in synchronous or asynchronous manner. In general, a multitasking operating system, such as Windows NT, is designed to share the processing power of one or more processing units in accordance with a predefined rule. For example, when running one or more applications under Windows NT in a single- or multi-processing environment, the operating system may allocate the processing power to the applications in a round robin fashion, giving each application equal access to the processing resources. It is also known to allocate such resources based on priorities of the applications. It should be noted that conventional computer systems that share processing power amongst application or bus bandwidth amongst processing devices do so without terminating any of the applications or abandoning an ongoing data transfer over a bus.

Because a Bluetooth system has a limited capacity to provide access to communication services over its supported links, the system allows some of the slave devices to remain locked to the master device in a so-called "parked" state. The parked slave devices cannot be active on the channel, but remain synchronized to the master device. Both for active and parked slave devices, the channel access is controlled by the master device. Under this arrangement, once a communication resource of the system becomes available, a parked mobile device is activated to access a requested service. However, until activated, this arrangement deprives the parked mobile devices from enjoying the benefits of the provided services. Thus, there exists a need to allocate the available communication resources of such system or similar systems in a manner that allows the mobile devices to take advantage of the available services

Brief Description of the Drawings

FIG. 1 is a block diagram of an exemplary system that utilizes the present invention.

FIG. 2 is a block diagram of a Service Discovery Protocol (SDP) that is used in the system
5 of FIG. 1.

FIG. 3 is a block diagram of a network access point that operates in accordance with the
present invention.

FIG. 4 is a flow chart of a method for providing service access to mobile devices in
accordance with the present invention.

Detailed Description of the Invention

According to the present invention, a plurality of mobile devices access offered
services over a communication system. A host processor manages service access to the
mobile devices over one or more wireless asynchronous connectionless links. A link
manager manages the one or more wireless asynchronous connectionless links in response
15 to commands from the host processor. The system of the invention includes an access
queue that queues service access requests from a group of mobile devices. The host
processor issues commands that grant and terminate service access to all or each of the
mobile devices in the group of mobile devices in accordance with a predefined access
policy. For example, the predefined access policy may correspond to the attributes of a
20 service type and/or a subscription to the service by a user.

According to some of the more detailed features of the present invention, access for
an ongoing service by one of the mobile devices in the group of mobile devices is
terminated in accordance with a predefined service termination policy. For example, when
one of the mobile devices in the group of mobile devices requests service access, the
25 request is granted based on a priority assigned to a response to the requested service. If a
response to a request for service has an assigned priority that is higher than an ongoing
service, the ongoing service may be terminated so that the response may be communicated
to the requesting mobile device based on the assigned priority. Thereafter, the service
access to the terminated service may be resumed in accordance with a predefined service
30 resumption policy.

According to other more detailed features of the invention, the mobile devices can either request a priority status in the access queue or request to be periodically informed of their priority in the access queue. Further, a mobile device can be informed about availability of service, while other mobile devices in the access queue are being serviced.

5 Another aspect of the invention relates to a method of accessing communication services that require receiving service access requests from a group of mobile devices. The received access requests are queued and service access is granted to all of the mobile devices in the group of mobile devices based on a predefined access policy. Access to an ongoing service by one of the mobile devices in the group is terminated in accordance with
10 a predefined service termination policy, and the terminated ongoing service is resumed in accordance with a predefined service resumption policy.

At least one of the predefined access policy, service termination policy and predefined service resumption policy is dependent on communication link resources of the communication system, for example, the available communication channels of the system.
15 In one exemplary embodiment, the wireless communication channels include a predefined number of time-slots within a time frame of a radio frequency channel. Further, at least one of the predefined access policy, service termination policy and predefined service resumption policy corresponds to the attributes of a service type and/or the attributes of a subscription to a service by a user.

20 Referring to FIG. 1, a system 10 that advantageously implements the present invention is shown. The system of the invention is preferably implemented over a communications network that provides wired or wireless links for one or more mobile devices 12 that operate within coverage areas 14. One such wired communications link is provided over the Internet 16, which is a collection of interconnected (public and/or
25 private) networks that are linked together by a set of standard protocols (such as WAP, or TCP/IP) to form a global, distributed network. In this way, service provider servers 26 may provide various mobile-device services via the Internet 16. Various wireless links 17 that support defined protocols may be used in connection with the present invention. Examples of such protocols include those defined by Bluetooth, IEEE 802.11, GSM, IS-
30 136, and IS-95.

In the preferred embodiment, the system 10 is implemented based on the Bluetooth System, as disclosed in Specification of the Bluetooth System (v1.B December 1st 1999), which is hereby incorporated by reference. Although Bluetooth is well understood the

operation of one such system is described to the extent necessary to enable one of ordinary skill in the art to make and use the present invention. Generally, a Bluetooth system provides short-range radio links over an unlicensed ISM band within which information is communicated using shaped binary frequency modulation to provide an information

5 symbol rate of 1 Ms/s. The Bluetooth system uses slotted channels in the form of time slots. On each channel, information is exchanged through packets that are transmitted on different hopping frequencies. A packet nominally covers a single slot, but can be extended to cover up to five slots.

As shown in FIG. 1, the system 10 consists of a radio module 18, a link controller
10 20, and a link manager 22 that interfaces via a host processor 24 which interface with the link manager 22 through a Host Controller Interface (HCI). The radio module 18 operates in the 2.4 GHz band to provide the physical medium over which mobile devices 12 communicate with the system 10. The band has a 83.5 MHz width that contains 79 RF channels that are spaced 1 MHz apart from each other. Each channel is represented by a
15 pseudo-random hopping sequence through the 79 RF channels. The hopping sequence is unique for each piconet and is determined by the device address of a corresponding master device, with the clock of the master device setting the phase in the hopping sequence.

The link controller 20 carries out the baseband protocols and other low-level link routines and includes hardware and software parts that perform baseband processing and
20 manage physical layer protocols as well as ARQ-protocol and FEC coding. The link controller 20 controls two types of links: Synchronous Connection-Oriented (SCO) links, and Asynchronous Connection-Less (ACL) links. The SCO link, which typically supports time-bounded information like voice, is a point-to-point link between a master device and a single slave device in a piconet. A master device can maintain up to three SCO links to
25 the same slave device or to different slave devices using reserved slots at regular intervals that form circuit-switched like connections. A slave device can support up to three SCO links from the same master device or two SCO links if the links originate from different master devices. Because SCOs are synchronous links, they do not support packet transmissions.

30 In contrast, the ACL link is a point-to-multipoint link that supports packet transmissions. An ACL link is established between a master device and all slave devices that participate on a piconet. In the slots not reserved for the SCO link(s), the master device can establish an ACL link on a per-slot basis to any slave device, including the

slave device(s) already engaged in an SCO link. Between a master device and a slave device, however, only a single ACL link can exist. ACL packets not addressed to a specific slave device are considered as broadcast packets and are read by every slave device.

5 The host processor 24 interfaces with the link manager 22 through a Host Controller Interface (HCI). The HCI provides a command interface to the link manager 22, and access to hardware status and control registers. The HCI is a subset of the host processor 24 and is responsible for communications with the link manager 22. Using an HCI firmware 25, which is a part of the host processor 24, this interface provides a
10 uniform method of accessing the baseband capabilities. The HCI firmware 25 implements the HCI commands for the system hardware by accessing baseband commands, link manager commands, hardware status registers, control registers, and event registers.

 The host processor 24 utilizes link policy commands controlled by the HCI to manage traffic in a localized network. The localized networks can be, for example, a
15 Bluetooth piconet, and/or scatternet. Other examples of localized networks that utilize the present invention include those specified by IEEE, under standard 802.11, which is hereby incorporated by reference. Several layers may exist between an HCI driver on the host 24 and the HCI firmware 25 in the system hardware. These intermediate layers, known as the Host Controller Transport Layer, provide the ability to transfer data without intimate
20 knowledge of the data. HCI events are used for notifying the host processor 24 when something occurs. Once the host processor discovers that an event has occurred, it parses the received event packet to determine the nature of the event. For example, the host processor 24 uses the HCI events to detect a service request that is generated by a mobile device 12.

25 Referring to FIG. 2, a block diagram for supporting a Service Discovery Protocol (SDP) in the system of FIG. 1 is depicted. The SDP is supported by the service provider 26, which runs a suitable server application, while the mobile devices 12 run corresponding client applications. The SDP defines the protocol for locating available services provided by or available through a service provider. The SDP provides for
30 discovery of a server application and the attributes of those services contained in service records by a client application. For providing services in accordance with this embodiment of the invention, a SDP server 202 and a mobile SDP client application 204 communicate with each other. .

The SDP server 202 maintains a list of service records 208 that uniquely describe the characteristics of the services associated with the server. In this way, a mobile client may retrieve information from the service records maintained by the SDP server by issuing an SDP or client service request 212. In the case of an SDP Service Search request, an
5 SDP Service Search response is returned with an SDP or server response 214 providing a list of all available services that meet the search pattern provided in the request. A single device may function both as an SDP server and as an SDP client. If multiple applications on a device provide services, an SDP server may act on behalf of those service providers to handle requests for information about the services that they provide. Similarly, multiple
10 client applications may utilize an SDP client to query servers on behalf of the client applications.

The set of SDP servers that are available to an SDP client can change dynamically based on the RF proximity of the servers to the client. When a server becomes available, a potential client must be notified by a means other than SDP so that the client can use SDP
15 to query the server about its services. Similarly, when a server leaves the proximity area or becomes unavailable for any reason, there is no explicit notification via the service discovery protocol. However the client may use SDP to poll the server and may infer that the server is not available if it no longer responds to requests.

Referring to FIG. 3, a block diagram of a system that operates in accordance with
20 the present invention is shown. A host processor 302 uses the link policy commands to control service access to mobile devices 12 that form a piconet 303 (or scatternet with other mobile devices) via an access point 304. In the exemplary embodiment, the access point 304 includes the radio module 18, link controller 20, link manager 22, and HCI of FIG. 1. Based on the status of mobile devices 12 in the piconet 303 (or scatternet), the host
25 processor 302 can set the link policy commands to several modes. The modes imposed by the host processor 302 affects how the link manager manages the piconet. The modes can be, for example, a hold mode, a sniff mode, and a park mode. The host processor 302 interfaces with the Internet 16 using an I/O 308 via a well known interface 312, such as the Ethernet. The host processor also controls the access point 304 and the radio module via a
30 physical interface 310, such as USB.

Because the piconet can only support a finite number of mobile devices, the present invention uses an access queue 306, which in an exemplary embodiment is a FIFO queue, for queuing mobile devices that exceed the number of allowable devices in the piconet. If,

for example, a device 12 initiates an access request over an ACL, the host processor 302 detects the event and places the device in the back of the access queue 306, where it enters the park mode. The park mode is a low power state, when the parked device does not participate in the piconet, but remains synchronized to the piconet. While in the park mode, the mobile device 12 is active for a short time interval called a beacon instant. During the beacon instant, the device can be granted access to the piconet by a broadcast signal from the master device of the piconet.

After the device is placed in the park mode, the host processor 302 determines the number of active devices in the piconet. If the number of devices in the piconet does not exceed the number of allowable devices, the host processor 302 initiates a link policy command called exit park mode. The exit park mode command switches the device from park mode to active mode, which allows the device to participate in the piconet 303. The host processor 302 then increments an internal register to maintain a count of the number of active devices in the piconet 303. It would be appreciated that although the present invention is described in connection with the park mode as specified by the Bluetooth specification, similar modes as specified by other standards, such as IEEE 802.11 may also be used to implement the present invention.

In accordance with the invention, if the number of devices 12 in the piconet exceeds the number of allowable devices, the host processor 302 grants service access to all of the mobile devices in a group of mobile devices 12 based on a predefined access policy that defines the criteria for terminating and resuming an ongoing service. In one exemplary embodiment, the predefined access policy may be dependent on communication link resources of the system, for example, the number of available wireless communication channels. As stated above, in the Bluetooth implementation of the invention, the wireless communication channels include a predefined number of time-slots within a time frame of a radio frequency channel.

In another embodiment, the predefined access policy corresponds to the attributes of a service type. For example, a user subscribing to a premium service may get higher priority for service access than a user that subscribes to a basic service. Under this arrangement, access for an ongoing service by one of the mobile devices in the group of mobile devices 12 may be terminated based on the predefined access policy. As stated above, the access policy defines the terms for terminating and later resuming an on going service. Thus, the termination of service may also be dependent upon a predefined service

termination policy based on which commands from the host processor are issued for terminating the service. Similarly, service resumption may be predefined in accordance with a service resumption policy that governs how the host processor issues commands for resuming a terminated service. Thus, in accordance with one feature of the present
5 invention, service access to a terminated ongoing service is resumed in accordance with a predefined service resumption policy. The service termination and resumption policies themselves may be dependent on communication link resources or the attributes of a service type or a user subscription independent of each other.

In another embodiment, access to a requested service by one of the mobile devices
10 in the group of mobile devices is granted based on a priority assigned to a response to a requested service. For example, if a device is requesting access to a flight information service in an air port by a user who needs departure flight information, the response to such access request may have a higher priority than access request to other services. Under this arrangement, each mobile device may request its corresponding priority in the access
15 queue. In response, mobile devices are periodically informed of their requested priority in the access queue. In yet another embodiment, the mobile devices are informed about availability of service, after other mobile devices in the access queue have been serviced.

FIG. 4 depicts accessing communication services in accordance with the method of the present invention. The method requires receiving service access requests from a group
20 of mobile devices, block 410. The received service access requests are queued in the access queue described above, block 420. Service access to all of the mobile devices in the group of mobile devices is granted based on a predefined access policy, block 430. An ongoing service provided to one or more of the mobile devices in the group of mobile devices may then be terminated in accordance with a predefined service termination policy
25 block 440, and later resumed in accordance with a predefined service resumption policy, block 450.

From the foregoing description it is apparent that the present invention facilitates access to communication services by providing such services based on a service access policy. The service access policy may be tailored to satisfy various service applications
30 requirements. For example, based on specific requirement of offering communication services in such places as airports, parks, shopping malls, etc., the access policy may be defined to meet user requirements, such that one user may not be deprived of service access when users exceed the maximum communication limits.

Claims

What is claimed is:

1. A communication system that provides access to communication services used by a plurality mobile devices over one or more wireless asynchronous connectionless links, comprising:
 - a host processor that manages wireless service access to the mobile devices over the one or more wireless asynchronous connectionless links;
 - a link manager that manages the one or more wireless asynchronous connectionless links in response to commands from the host processor; and
 - an access queue that queues service access requests from a group of mobile devices, wherein the host processor grants and terminates service access based on a predefined access policy.
2. The communication system of claim 1, wherein the predefined access policy is dependent on communication link resources of the communication system.
3. The communication system of claim 2, wherein the communication link resources include wireless communication channels.
4. The communication system of claim 3, wherein the wireless communication channels include a predefined number of time-slots within a time frame of a radio frequency channel.
5. The communication system of claim 1, wherein the predefined access policy corresponds to the attributes of a service type.
6. The communication system of claim 1, wherein the predefined access policy corresponds to the attributes of a subscription to a service by a user.
7. The communication system of claim 1, wherein access to an ongoing service is terminated in accordance with a predefined service termination policy.

8. The communication system of claim 7, wherein service access to the terminated ongoing service is resumed in accordance with a predefined service resumption policy.
- 5
9. The communication system of claim 1, wherein access to a requested service by one of the mobile devices in the group of mobile devices is granted based on a priority assigned to a response to a requested service.
- 10
10. The communication system of claim 1, wherein a mobile device requests its priority in the access queue.
11. The communication system of claim 1, wherein a mobile device is periodically informed of its priority in the access queue.
- 15
12. The communication system of claim 1, wherein a mobile device is informed about availability of service, after other mobile devices in the access queue have been serviced.
- 20
13. A method for providing communication services over one or more wireless asynchronous connectionless links, comprising:
- receiving service access requests from a group of mobile devices;
- queuing service access requests from the group of mobile devices;
- granting service access to all of the mobile devices in the group of mobile
- 25
- devices based on a predefined access policy;
- terminating access for an ongoing service by one of the mobile devices in the group of mobile devices in accordance with a predefined service termination policy; and
- resuming the terminated ongoing service in accordance with a predefined
- 30
- service resumption policy.

14. The method of claim 13, wherein at least one of the predefined access policy, service termination policy and predefined service resumption policy is dependent on communication link resources of the communication system.
- 5 15. The method of claim 14, wherein the communication link resources include wireless communication channels.
16. The method of claim 15, wherein the wireless communication channels include a predefined number of time-slots within a time frame of a radio frequency channel.
- 10 17. The method of claim 13, wherein at least one of the predefined access policy, service termination policy and predefined service resumption policy corresponds to the attributes of a service type.
- 15 18. The method of claim 13, wherein at least one of the predefined access policy, service termination policy and predefined service resumption policy corresponds to the attributes of a subscription to a service by a user.
- 20

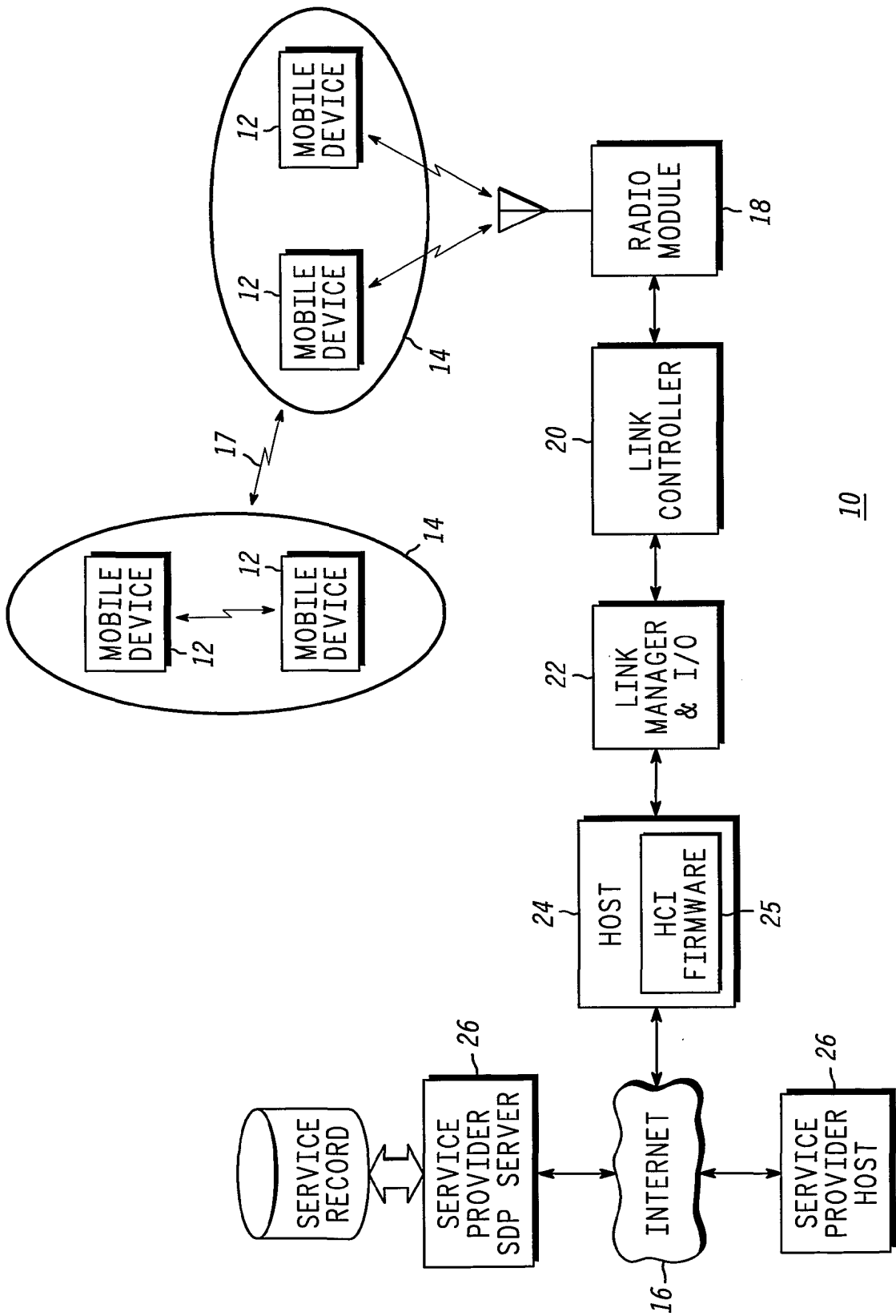


FIG. 1

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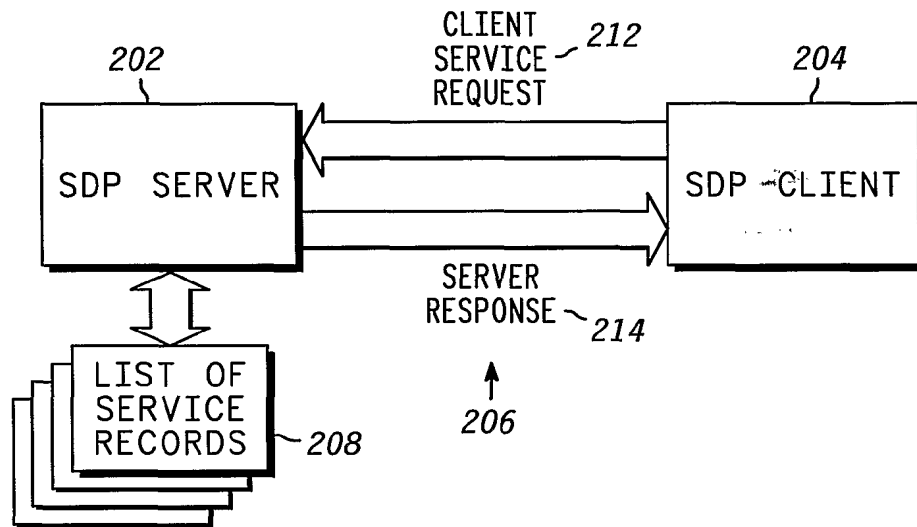
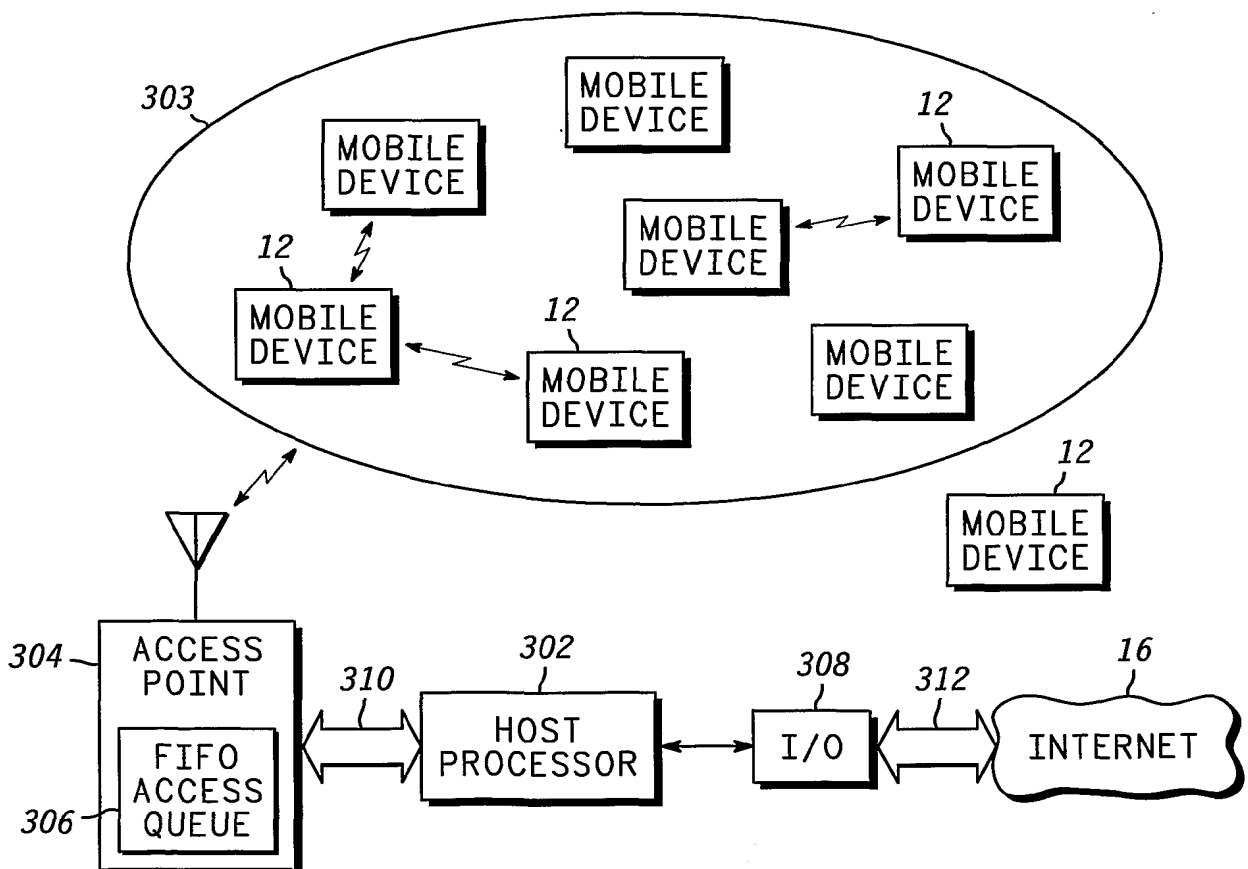
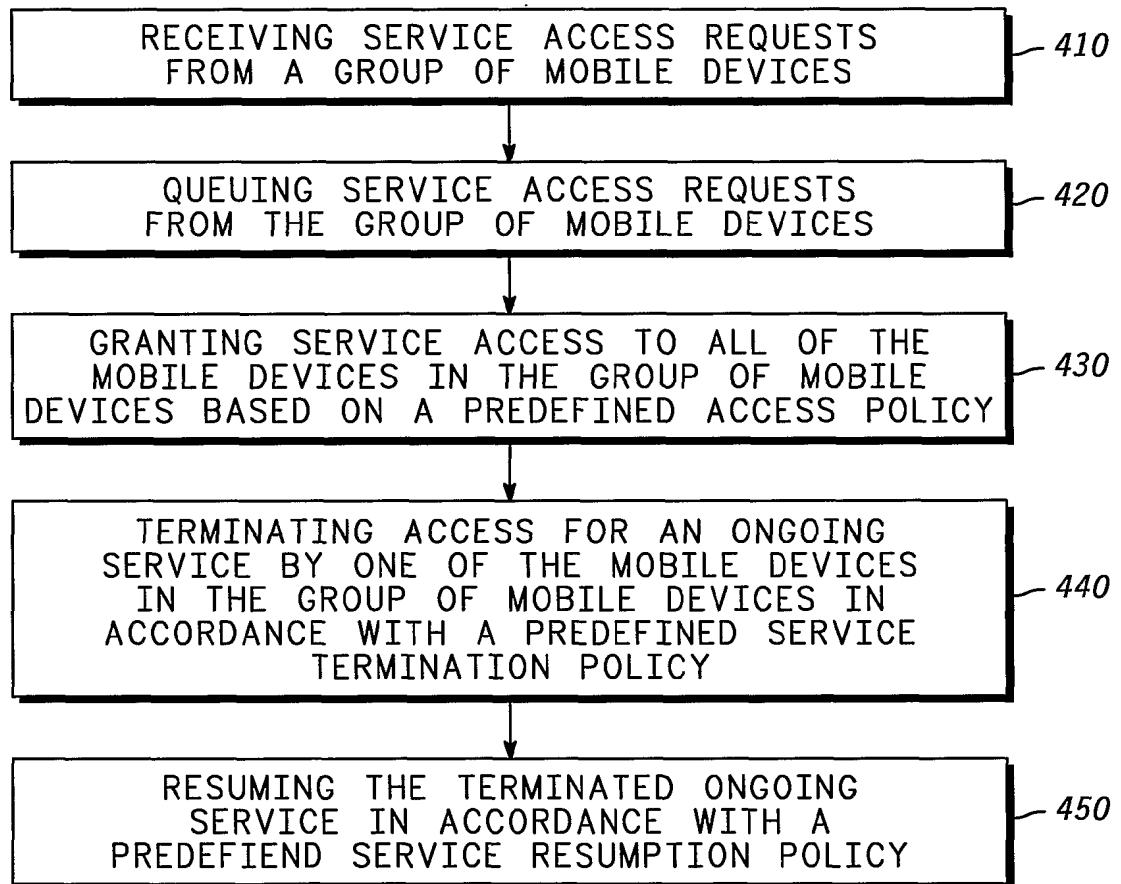


FIG. 2

FIG. 3



3/3

**FIG. 4**



US006035404A

United States Patent [19]
Zhao

[11] **Patent Number:** **6,035,404**
[45] **Date of Patent:** **Mar. 7, 2000**

[54] **CONCURRENT USER ACCESS CONTROL IN
STATELESS NETWORK COMPUTING
SERVICE SYSTEM**

11-66081 3/1999 Japan G06F 17/30

[75] Inventor: **Yan Zhao**, Fulton, Md.

[73] Assignee: **International Business Machines
Corporation**, Armonk, N.Y.

[21] Appl. No.: **08/926,207**

[22] Filed: **Sep. 9, 1997**

[51] **Int. Cl.⁷** **G06F 17/40**

[52] **U.S. Cl.** **713/201; 709/225**

[58] **Field of Search** 395/187.01, 186,
395/200.55, 188.01; 713/200, 201, 202;
709/225, 227, 228, 229, 224

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Primary Examiner—Robert W. Beausoliel, Jr.

Assistant Examiner—Christopher A. Revak

Attorney, Agent, or Firm—Karl O. Hesse

[57] **ABSTRACT**

System and method for managing user logins to a restricted computer service over a stateless network. Single user and multiple, or concurrent, user accounts can be maintained with this logging system. Users are assigned a data mask and an internal user ID (IUID). During a login attempt, the mask is used to scan a user login map to determine if the login will be permitted. For single users, the login is allowed if a current session is not already in progress, as indicated by the login map. For concurrent users, the login is allowed if the maximum number of concurrent users for the account does not already exist, as indicated by the login map. When a login is not allowed, a current session may be terminated or set to be terminated after a fixed interval of time, thereby allowing the requested login. A state lookup table (SLT) is maintained to temporarily keep track of each session in progress and includes a session identifier, the IUID, the starting time, and any termination time established for the session.

8 Claims, 5 Drawing Sheets

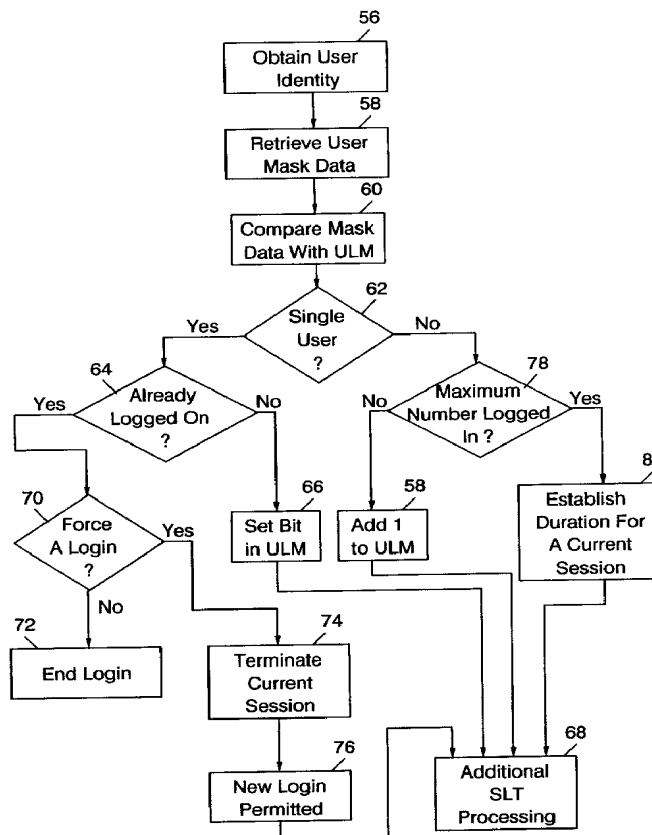


FIG. 1

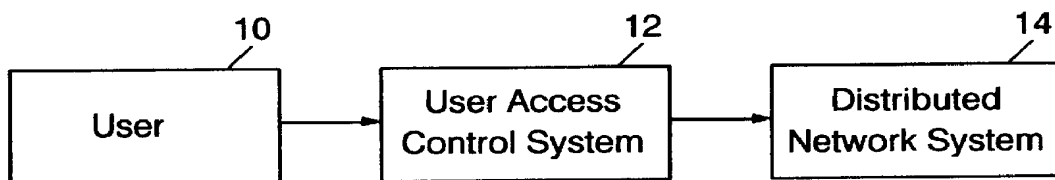


FIG. 2

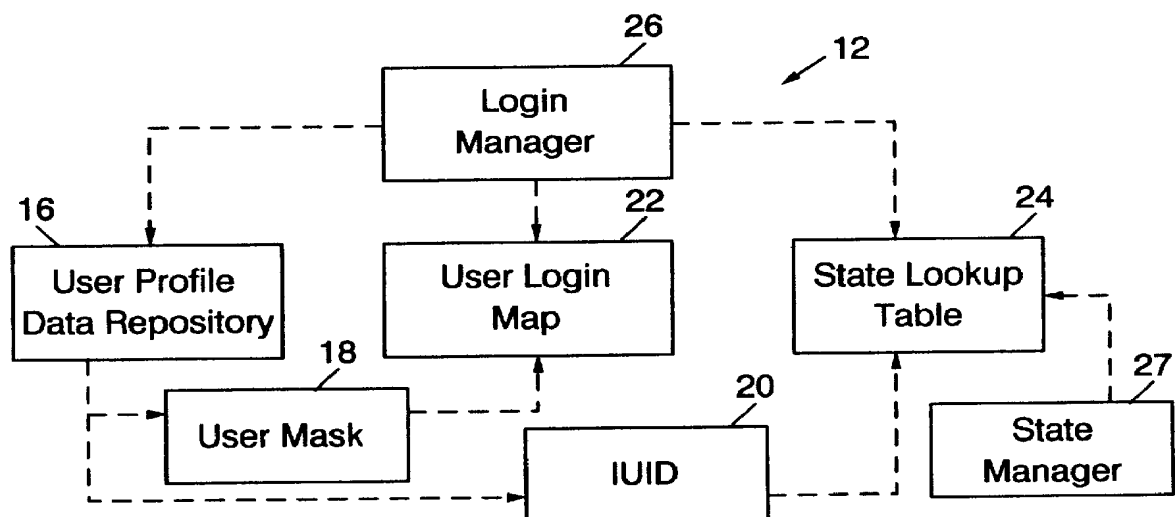


FIG. 3

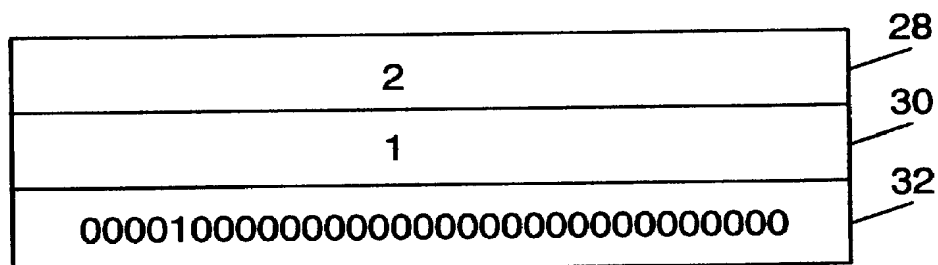


FIG. 4

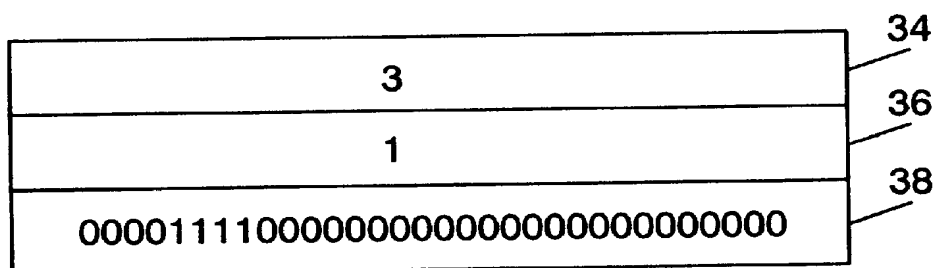


FIG. 5

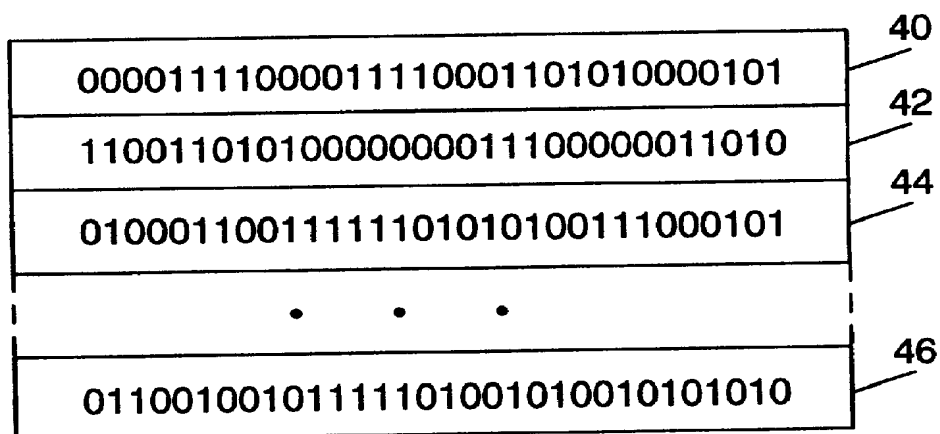
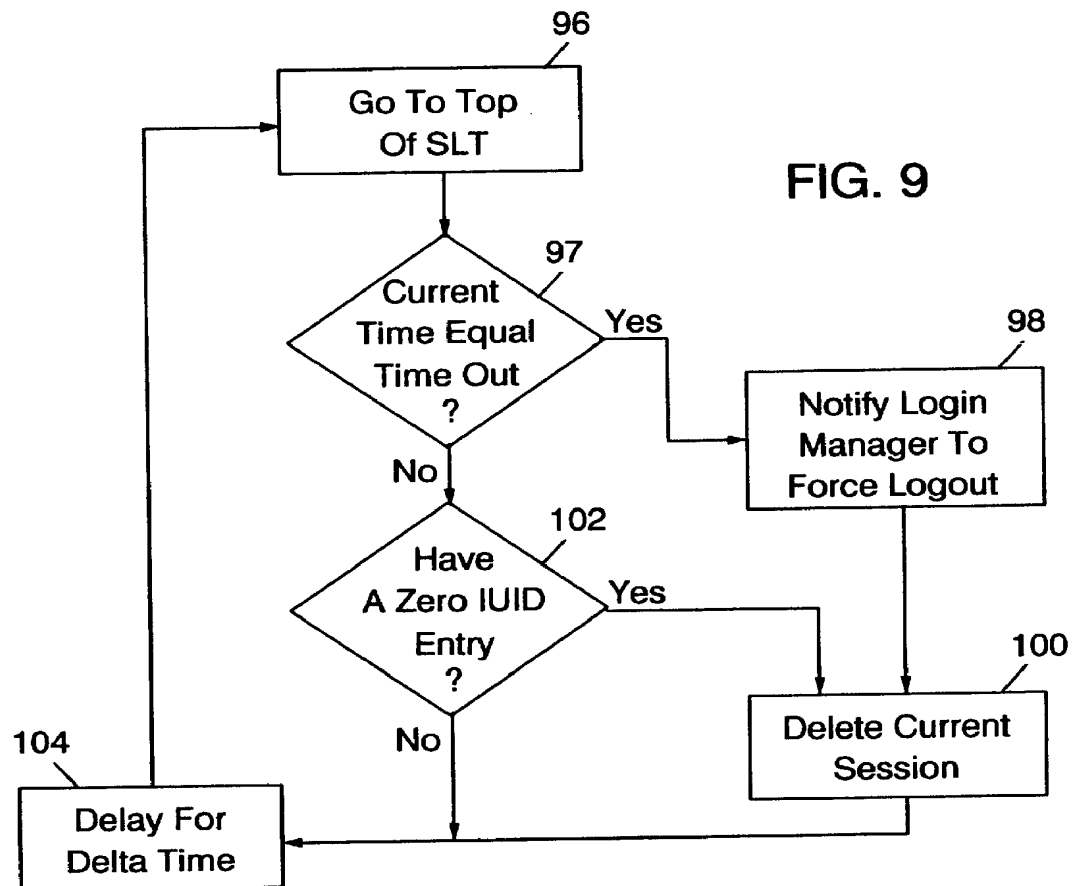


FIG. 6

Session ID	IUID	Start Time	Time Out
0001002	10002	960826024030	960826064030
0010000	10002	960826044030	
0100231	0	960826054050	
0100459	10034	960826064050	

FIG. 9



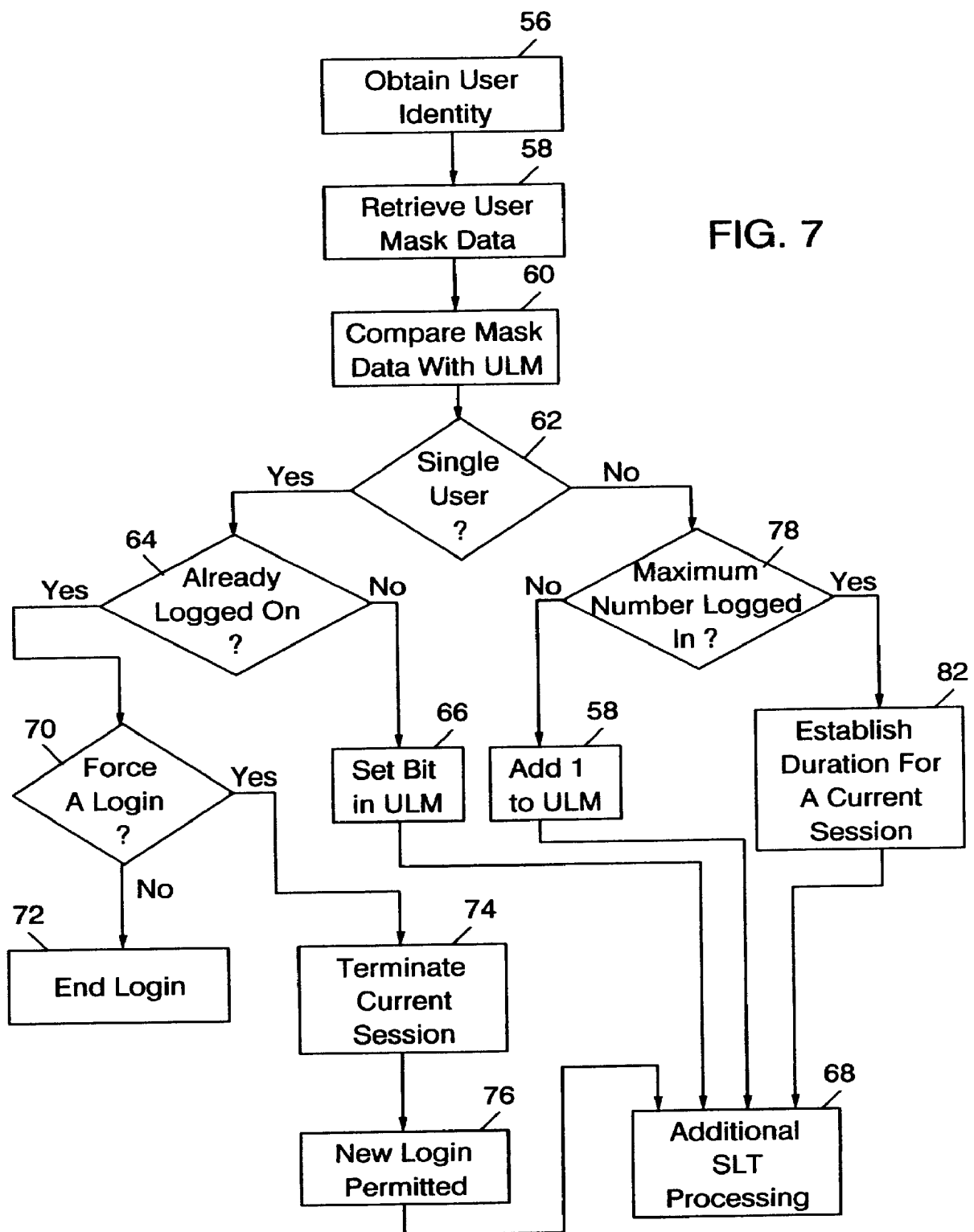


FIG. 8A

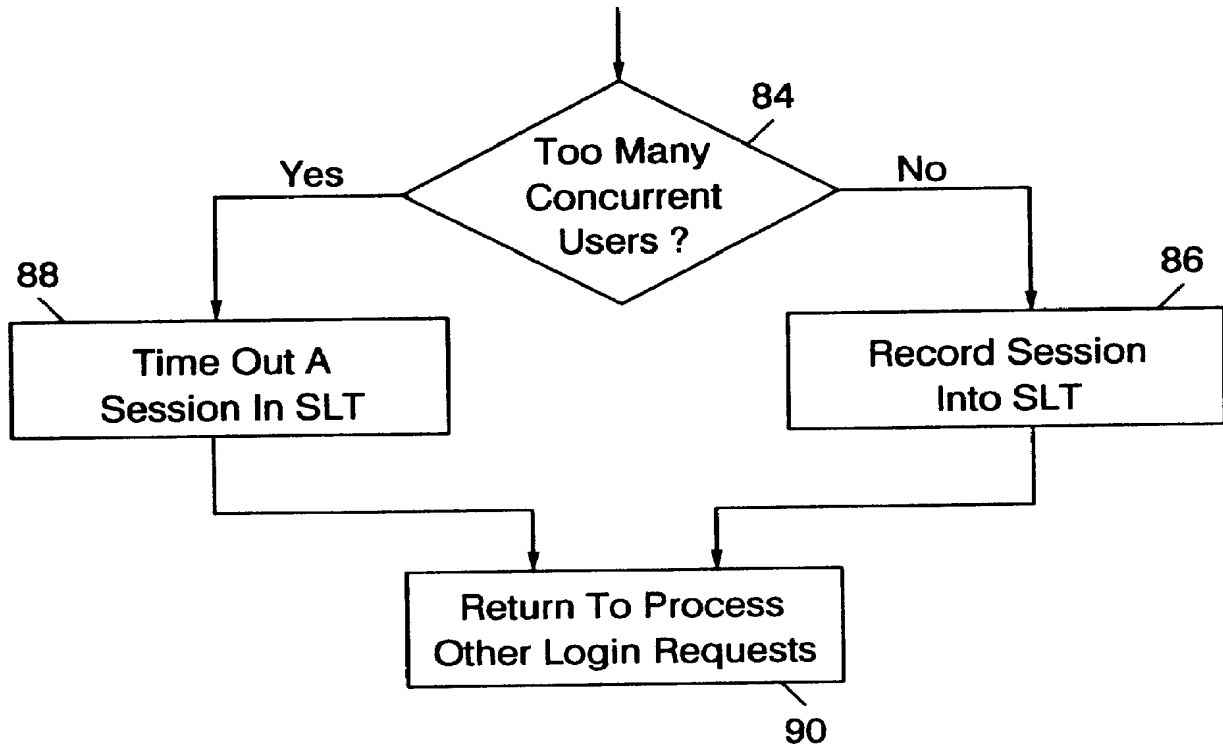
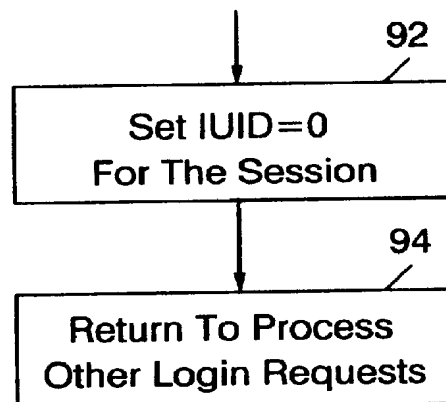


FIG. 8B



CONCURRENT USER ACCESS CONTROL IN STATELESS NETWORK COMPUTING SERVICE SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates, in general, to online computer systems and, more specifically, to access control of concurrent or multiple users using the same account or master ID number.

2. Description of the Prior Art

Online access to a computer or host system is becoming more commonplace with the passage of time, partly because of the availability of several publicly oriented computer access networks, and the Internet. This changing of the way people can get information has created a new field of commerce, i. e., electronic publishing. Whereas materials were traditionally published in hard copy format, there has become a need to make materials available on computer readable media, such as a CD-ROM. Now, much interest is being expressed for online publishing. For example, when a person wants to peruse a certain technical reference book, he might simply log onto the Internet and view the contents of the publication on the video monitor. In some cases, hard copy printouts may be made for appropriate text or graphic portions of the document or book from the online session.

One of the problems associated with this type of publication distribution is the ability to fairly and properly charge the user for using the information. A desirable method would be to charge the user for the ability to access this material, which is much like the charges made when the material is distributed in hard copy or CD-ROM format. This is not very difficult for a single user, i. e., one who has a separate account with the publisher. The user simply registers to use the information and agrees to pay the agreed compensation. With this type of arrangement, no limit is usually placed upon the access time, thus the user is free to peruse the materials as long as he wants. The difficulty comes in when the situation of a concurrent user, or one that gains access simultaneously under a common account, uses the system. Such may be the case at educational institutions and large companies. The institution or company may simply want to have a master account which would allow simultaneous access to the materials by a maximum number of online users, all authorized by the entity to view the publication. For example, a corporate account may allow anyone with proper access in the corporation to view online a particular publication, up to a maximum of twenty users concurrently, or simultaneously. That would be much like charging for selling to the corporation twenty copies of the book or document for unlimited use.

One of the difficulties in establishing this type of online publishing system is in properly permitting and controlling access to the system in a manner consistent with these objectives. This is especially true when dealing with a stateless network, like the Internet's World Wide Web (www), which does not maintain user states of logged in or logged out. In conventional host-based computer networking systems, logged in users and session states are maintained by the involved hosts. The system can control how many login users are allowed at any given time, and users log out when finished. But, when using the HTTP protocol, no user logout activity is supported. Consequently, it is desirable, and it is an object of this invention, to provide an access control system for concurrent users in a stateless network which is effective and usable in access applications

which require specific accounting parameters, like online publishing. To this extent, it is also desirable, and a further object of this invention, to provide an access control system which can determine if additional concurrent user logins are permitted, when a user has logged out, and when a user can login if all the available login slots are currently being used.

SUMMARY OF THE INVENTION

There is disclosed herein a new and useful computer access control system for a stateless network which can keep track of concurrent users assigned to a common account or ID number, and which can also permit logins to single user accounts. The system includes a login manager and a state manager which monitor the status of the various areas and functions of the system. A user login map (ULM) is used to keep track of the number of users logged onto the system. In a preferred embodiment of the system, this map consists of a plurality of 32-bit wide binary words. Changing the value of the binary bits at a predefined position determines whether a specific user account is currently logged into. Single user accounts have one bit assigned to them, whereas multiple user (concurrent) accounts have a plurality of bits assigned to the area which holds the number of current logins.

A user attempting to log into the system enters a user ID and password in the usual manner. Once that is verified, the system obtains a user mask and an internal user ID (IUID) from the user's profile area. The mask is applied to the user login map to determine if the login will be permitted. If permitted, the IUID is entered into a state lookup table (SLT) along with other information about the logged in session.

The user mask defines the area in the user login map that must be checked to see if a login will be allowed. For a single account user, one bit in the login map is examined to see if there is already a login under that account, or same IUID. If so, access will be denied or, in some cases, a forced login may be initiated by the logging on user. If no present login is indicated, the user is logged on and the user login map is updated by setting the appropriate bit in the login map. For a concurrent or multiple account, more than one bit in the login map is examined to see if the maximum number of logins already exists. If not, the requested login is permitted and the user login map is updated by adding one to the binary value in the map.

If the maximum number of logins already exists, the system sets a time-out period for the session that has been in progress the longest. It also informs the logging in user of that time. After the expiration of that time, or if a concurrent user logs off before that time, the login for the requesting user is permitted.

A state lookup table (SLT) is used to keep track of the login sessions in progress. This table includes a session identifier, the IUID used to establish the session, a starting time for the session, and a "time out" time for the session if one has been established. Maintenance of the table is performed by the system login manager and by a state manager. This maintenance includes purging the table of terminated sessions and forcing logouts when a time-out entry has been equalled or exceeded.

BRIEF DESCRIPTION OF THE DRAWINGS

Further advantages and uses of this invention will become more apparent when considered in view of the following detailed description and drawings, in which:

FIG. 1 is a block diagram of the environment in which the present invention functions;

FIG. 2 is a block diagram illustrating the major components of the invention in an approximate flow path relationship;

FIG. 3 is a representation of a single user mask as used in this invention;

FIG. 4 is a representation of a concurrent user mask as used in this invention;

FIG. 5 is a representation of a user login map (ULM) as used in this invention;

FIG. 6 is a representation of a state lookup table (SLT) as used in this invention;

FIG. 7 is a flow chart illustrating how the access control system functions according to a specific embodiment of this invention;

FIG. 8a is a flow chart illustrating additional access control system functions performed during login by the login manager;

FIG. 8b is a flow chart illustrating additional access control system functions performed during logout by the login manager; and

FIG. 9 is a flow chart illustrating additional access control system functions performed by the state manager according to a specific embodiment of this invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Throughout the following description, similar reference characters refer to similar elements in all of the figures of the drawings.

Referring now to the drawings, and to FIG. 1 in particular, there is shown a block diagram of the environment in which the invention functions. The user 10 is attempting to gain access to the distributed network system 14 through the user access control system 12. The distributed network system 14 could be any of a number of online systems, such as an online publishing system or other Internet web page controlled application. The network is a stateless network which does not need to keep track of logins and logouts, such as the Internet's World wide Web (www) which is based on the HTTP protocol. The control system 12 interfaces between the user 10 and the system 14 to govern the access and to make sure that the access is proper and within the strict rules set out by the owner of the application program to be run over the system. It is emphasized here that the control system 12 is mainly interested in establishing and ending logins, not in providing an accounting or log of activity for billing purposes. If that is desired, it can be done by other means commonly known in the prior art.

FIG. 2 shows the major components of the control system 12 of FIG. 1. The user profile data 16 contains essential login information on a particular individual user. Normally, this information would include the usual user ID and password much like conventional user access control systems. This information would be stored in the data repository 16 during user initial registration or by a system operator. Once access is gained in the normal manner by the user ID and password, additional information in the user profile data repository 16 is retrieved for use by the login system. As illustrated, a user mask 18 and an internal user ID (IUID) are a part of the user profile and are used to further determine the access rights of the user. The mask 18 and the IUID 20 are also placed in the user profile data repository 16 automatically after initial user registration, or manually placed therein by a system operator or administrator.

The mask 18, as will be further described in conjunction with FIGS. 3 and 4, is for use in scanning the data in the user

login map (ULM) 22. This scanning will determine if the login will be permitted. The IUID 20, as will be described further in conjunction with FIG. 6, is for state keeping during user navigation of the service facility (i. e. web pages), and for use in recording session data in the state lookup table (SLT) 24. The table 24 is used, among other things, to determine if a particular concurrent user will be forced off to make way for a new login. All of this is under the control of the login manager 26 with multiple computation methods. The SLT 24 is created by the login manager 26 at system initialization and is maintained by a state manager 27, as will be described in more detail later herein.

FIG. 3 illustrates a mask typical of that used for a single user. Although the present invention allows for the orderly access of concurrent users, single users who have access only one at a time are also processed by the system. The single user mask in FIG. 3 includes data which can define or indicate three parameters. The first parameter is the location of the area in the user login map 22 which will be looked at by the mask. The mask area 28 shows a value of 2, meaning that the second word in the user login map 22 will be used. More detail about the user login map and the application of the mask data will be described in conjunction with FIG. 5.

The mask area 30 shows a value of 1, meaning that the mask works on one word in the login map 22. The mask area 32 is the remainder of an unsigned integer array representing the actual mask that will be applied to the login map 22 in the areas indicated by the areas 28 and 30. As shown here, area or mask 32 is a 32-bit binary word having the 5th most significant bit as 1. All single user masks will have only one bit in the mask equal to 1. The 1 signifies the bit in the login map which must be set or reset to show the login status of the user.

FIG. 4 illustrates a mask typical of that used for a concurrent user. The value of 3 in the mask area 34 indicates that the 3rd word in the login map 22 will be the start of the mask comparison and, according to the area 36 value of 1, only one word will be compared. Since the number of concurrent users a system may permit may exceed one word, the value of area 36 may be larger than 1 in those cases. The ones in the 5th through 8th most significant bits indicate that those four bits are the areas in the login map that will contain the status of 15 users who are allowed for current login with the same master login ID, or IUID. In both the single user and concurrent user masks, the size of the word containing the bits can be other than 32, as shown herein, without departing from the teachings of the invention.

FIG. 5 illustrates a specific valued and structured user login map being used in this embodiment for the login map 22 shown in FIG. 2. According to FIG. 5, the login map is an unsigned long integer array with $W \times N$ bits, where W is the word length in bits (32) and N is the number of words in the map. Only four 32-bit words (40, 42, 44 and 46) are shown, although more or less words and bits per word are within the scope of this invention. The ones in the map indicate the number of current or present logins. For single user ID's, just one bit is used and it indicates that there is no login if zero or that there is a login if one. For concurrent user ID's, more than one bit is used to define the number of present logins for that IUID, with the number being a binary weighted value using all the bits for that IUID. For example, one word would allow $2^w - 1$ users.

As an example, the single user mask shown in FIG. 3 is compared to the login map values shown in FIG. 5. Referring to both Figures, area 28 indicates that the second word of the map will be the starting place for the comparison, and

area **30** indicates that one word will be compared. Area **32** indicates the actual mask to be compared with the defined word area in the map. Consequently, word **42** will be masked by the bits in area **32**. The 1 in area **32** is matched with a 1 in area **42** at the 5th most significant bit position. This tells the login manager that a login is already present for that user IUID, and normally access would be denied. As will be described later, a procedure for forced login is included in the system. If the bit under consideration in the area **42** is 0 at the time of attempted login, a login would be permitted and the bit set to 1 by the login manager.

As another example, the concurrent user mask shown in FIG. **4** is compared to the login map values shown in FIG. **5**. Referring to both Figures, area **34** indicates that the third word of the map will be the starting place for the comparison, and area **36** indicates that one word will be compared. Area **38** indicates the actual mask to be compared with the defined word in the map. Consequently, word **44** will be masked by the bits in area **38**. The ones in area **38** are matched with a **0110** in area **44** at the 5th through 8th most significant bit positions. This tells the login manager that six logins are already present for that user account. The 4-bit representation is weighted in binary fashion to calculate the 6 users (2^2+2^1). Since a value (0) needs to be used to indicate no users, the total number of users that can be represented by the 4-bit number is **15**. Consequently, $2^{32}-1$ can be represented by the complete word and, as stated before, more than one word can be used to represent concurrent users in the login map. Any number of bits greater than 1 can be used for defining the total number of concurrent users permitted to be logged on at the same time. If another login is permitted, the login manager increments or adds one to the binary value in area **44**, which would result in the bits **0111** at the same positions used in this example. Therefore, the size of the mask for the user determines whether he has single user or concurrent user access rights and, in the case of a concurrent user, how many users may be logged on at the same time.

FIG. **6** illustrates details of the state lookup table **24** shown generally in FIG. **2**. When a user attempts a logon, the state lookup table is used for various functions, such as recording session ID's, active users, and determining the status of logins already in progress. The table, in this embodiment, is a portion of memory in a computer system which is allocated, in run time, to holding this particular information. Each session, which is established after a user login, has an entry created in the table. A session ID **48** is generated dynamically for a session. It may be a numerical value which increases (to a maximum limit) and rotates for each session allowed on the system. A coded value reflective of such things as the user's level of access or date/time logged on, or any other value which can distinguish one session from another.

The internal user ID (IUID) for the session is also entered into the state lookup table. The IUID is obtained from the user profile data in the same manner as the user mask. Both are obtained when the user accomplishes the normal logging procedure, such as entering his own user ID and his password successfully. The user mask and IUID are normally the same for all users assigned to the same account and approved for the same concurrent login privileges. This is true even though each individual user has a separate individual user login ID and password. The internal user ID (IUID) also is of the same form and bit size for all users, thereby facilitating the allocation of memory for its storage in the table. In FIG. **6**, the IUID's are all five-digit decimal values.

The starting time for a session is entered under the heading Start Time **52**. If there is a logout time mandated by the system, the time is specified under the heading Time Out **54**. Times may be actual as shown (year-month-day-hour-minute-second) or a delta or difference from a known time. When a session is in progress, the IUID is present in the table. When a user logs out, the IUID is set to zero, as shown for the 3rd session illustrated. Periodically, the state manager **27** checks the table and purges the 0 IUID sessions which have been logged out. If the maximum concurrent user number is reached, the login manager **26** can set mandatory time out times for the earliest started session having the same IUID. The state manager **27** monitors to see when those times are reached and then removes them from the SLT. In general, the login manager performs the tasks of setting an IUID to 0 and setting a time for time-out in the SLT. The state manager **27** generally performs the tasks of cleaning up the 0 IUID and time out entries in the SLT.

The first two sessions in the state lookup table of FIG. **6** indicate that two concurrent users have logged onto the system. Note that the IUID's are the same for these two sessions. Note also that session **0001002** is set to be limited to a time out of not beyond a specified time, whereas session **0010000** has not been given a time-out time. Forced time-out times can be derived from several circumstances. It can be from the level of access permitted for the individual user, the need to limit a concurrent user's time to allow for another user to logon, or from other circumstances. Session **0100231** has already been logged out, and session **0100459** is currently in progress without a required ending time. Therefore, both do not have time-out times indicated for their session. Session **0100459** is either a single user session or one user of a concurrent user IUID. The state lookup table in FIG. **6** permits the system of this invention to manage the distribution of the account between all those authorized users in such a manner that equitable use of a limited facility can be had by all those authorized to use the system, especially when more than the permitted number of users are trying to use the system at the same time.

FIG. **7** illustrates, in flow chart form, how the user access control system manages the login and session activities according to a specific embodiment of the invention. The first step is to obtain the user identity **56**. From the normal user ID and password given at the start of the login, the system next retrieves the user mask data **58** which includes the internal user ID (IUID) and the user mask. The mask data is then compared (block **60**) to the user login map (ULM) to determine the current login status. A determination is made from the mask if the user attempting a login is a single User (block **62**). As previously indicated, a single 1 bit in the mask indicates a single user, whereas more than one 1 bit indicates a concurrent user.

Assuming that the user is found to be a single user, process flow continues to block **64** where it is determined whether that slot is already being used. That is, whether the one available login allowed for that user's IUID is already in progress. If there is no current login, the bit in the user login map corresponding to the 1 bit in the mask is set to 1, as indicated by block **66**, and the login is permitted. Flow control then proceeds to block **68** for additional state lookup table (SLT) processing.

If the comparison in block **64** indicates that the available slot (a logged in session) is already in progress, the user attempting to login is asked if a forced login should be attempted, as indicated in block **70**. Such communication between the access control system and the user attempting login can be by conventional methods, such as the sending

of appropriate web pages to the user for response when the system is operating in the Internet environment. If a forced login is not requested, the login attempt is ended (block 72). If the forced login is requested, the login manager 27 terminates the current session (block 74). According to the configuration of the system, there can be several different ways to accomplish this result. In one case, the current user could be logged out immediately and the new login allowed. In another case, the current user could be given a time limit for logging off and notified of the time left, after which the new user would be logged on. The time to wait for logging on in this case could be conveyed to the user waiting to logon. Once the new login is permitted (block 76), the ULM would be updated and flow control proceeds to block 68 for additional state lookup table (SLT) processing.

If the user is found to be a concurrent user in block 62, the system next determines from the mask data if the maximum number of simultaneous logins are existing at the present time (block 78). If not, 1 is added to the user login map (block 80), the login is permitted, and flow control proceeds to block 68 for additional processing. If the maximum number of logins already exists, then the state lookup table (SLT) is consulted to determine which session for the same concurrent user IUID has been established for the longest time. That session is then given a termination or "time out" time (block 82) and that information is entered into the SLT. Flow control then proceeds to block 68 for additional processing. As in the case of the single user forced login situation, the concurrent user here may be advised of the time left for the current session to be timed out, thereby indicating to the logging in user the maximum time he needs to wait until he can get access to the system.

FIGS. 8a and 8b illustrate the additional processing accomplished by the login manager 26 with respect to the SLT. For a login, FIG. 8a shows that a determination is made (block 84) whether there are too many concurrent users already logged on. (This determination is the same as accomplished in block 78 of FIG. 7 and may not be a new determination.) If not, the session is recorded into the SLT as indicated in block 86. If there are too many concurrent users, a session in the SLT is timed out (block 88). Normally, this would be the session that has the earliest starting time. After performing the indicated function, the login manager 26 returns to process other login requests (block 90). For a logout, FIG. 8b shows that the login manager 26 sets the IUID equal to 0 for the recorded session (block 92) in the SLT. Then, the login manager 26 returns to process other login requests (block 94).

FIG. 9 illustrates the additional processing accomplished by the state manager 27. This processing is mostly of a management nature to keep the state lookup table (SLT) 24 up-to-date and to effect any actions that the current status of the table dictates. Beginning at the top of the SLT (block 96), the state manager 27 determines if the session is to be terminated because it has equaled or exceeded the allowed session time, or "time out" time (block 97). If so, the login manager 26 is notified to force a logout (block 98) and the session is deleted (block 100) from the SLT. When there does not need to be a forced logout, the state manager 27 looks at the session entry in the SLT and determines whether it is a terminated session which is still recorded in the table (block 102). Such a condition is indicated by a zero IUID recorded in a session. If such is the case, the session in the SLT is deleted (block 100) and process flow continues to block 104. If there are no sessions to delete, block 100 is bypassed and process flow continues directly to block 104. After a delay for a time "delta" (block 104), the state

manager returns to the top of the SLT to go through the process again. In some cases, the delta time may be essentially zero. The mechanics of this process may take several different forms to scan all of the session entries. For example, all entries may be looked at on each pass, or the state manager may process a single session and then go down the list on a next scan, until all of the sessions in the SLT have been scanned for any required action by the state manager.

It is emphasized that numerous changes may be made in the above-described embodiments without departing from the teachings of the invention. For example, the system may not only be used with an online login procedure involving the world wide web on the Internet, but may also be used with inhouse or local computer networks that are setup to keep track of a maximum number of concurrent users allowed to access the system at the same time. Also, the system described herein may be useful in allowing access to a restricted machine or entry system which needs to limit concurrent access to a fixed number of users.

It is intended that all of the matter contained in the foregoing description, or shown in the accompanying drawings, shall be interpreted as illustrative rather than limiting.

Having thus described the invention, what is claimed is:

1. Apparatus for the control of user access over a stateless network to a restricted system which permits simultaneous access by concurrent users, said apparatus comprising:

means for assigning an internal user ID to each user;

mapping means for recording the number of current logins, the mapping means being in the form of a user login map which contains a plurality of binary words, with each of said binary words containing a plurality of binary bits, and wherein one or more of said binary bits in the same word are indicative of the number of current logins for a particular internal user ID;

validating means for determining if a requested login is permitted; and

logging means for temporarily keeping a record of each access session in progress wherein only one bit of a word is used to indicate the current status for a single user internal user ID.

2. Apparatus for the control of user access over a stateless network to a restricted system which permits simultaneous access by concurrent users, said apparatus comprising:

means for assigning an internal user ID to each user;

mapping means for recording the number of current logins, the mapping means being in the form of a user login map which contains a plurality of binary words, with each of said binary words containing a plurality of binary bits, and wherein one or more of said binary bits in the same word are indicative of the number of current logins for a particular internal user ID, and wherein a bit group containing a plurality of bits of the same word are used to indicate the current number of logins for a particular concurrent user internal user ID, with said number being determined by weighting individual bits in the group;

validating means for determining if a requested login is permitted; and

logging means for temporarily keeping a record of each access session in progress.

3. The control apparatus of claim 2 wherein a word has thirty-two bits.

4. Apparatus for the control of user access over a stateless network to a restricted system which permits simultaneous access by concurrent users, said apparatus comprising:

mapping means for recording the number of current logins;

means for assigning an internal user ID to each user;

validating means for determining if a requested login is permitted, the validating means including a user mask of binary bits for determining the current logins as recorded in the mapping means, and wherein the validating means also includes number and location identifiers about the words in the mapping means which will be compared with the user mask to determine the current logins; and

logging means for temporarily keeping a record of each access session in progress.

5. A method of controlling user access over a stateless network to a restricted system which permits simultaneous access by concurrent users, said method including the steps of:

assigning an internal user identification (IUID) to each user;

maintaining a user login map which is indicative of the number of current logins for a particular IUID, wherein the user login map contains a plurality of binary words, with each of said binary words containing a plurality of binary bits, and wherein one of said binary bits of a word is used to indicate the current status for a single user IUID;

providing a user mask of binary bits for use with said login map;

comparing said user mask with said login map to determine if a login will be permitted; and

authorizing the login if said comparison indicates that the maximum number of logins allowed for said IUID will not be exceeded by said authorizing.

6. A method of controlling user access over a stateless network to a restricted system which permits simultaneous access by concurrent users, said method including the steps of:

assigning an internal user identification (IUID) to each user;

maintaining a user login map which is indicative of the number of current logins for a particular IUID, wherein the user login map contains a plurality of binary words, with each of said binary words having a bit group containing a plurality of bits that are used to indicate the current number of logins for a particular concurrent user IUID, said number being determined by weighting individual bits in the group;

providing a user mask of binary bits for use with said login map;

comparing said user mask with said login map to determine if a login will be permitted; and

authorizing the login if said comparison indicates that the maximum number of logins allowed for said IUID will not be exceeded by said authorizing.

7. A method of controlling user access over a stateless network to a restricted system which permits simultaneous access by concurrent users, said method including the steps of:

assigning an internal user identification (IUID) to each user;

maintaining a user login map which is indicative of the number of current logins for a particular IUID, wherein the user login map contains a plurality of binary words, with each of said binary words containing a plurality of binary bits, and wherein one or more of said binary bits in the same word are indicative of the number of current logins for a particular IUID;

providing a user mask of binary bits for use with said login map, the user mask including number and location identifiers about the words in the user login map which will be compared with the user mask to determine the current logins;

comparing said user mask with said login map to determine if a login will be permitted; and

authorizing the login if said comparison indicates that the maximum number of logins allowed for said IUID will not be exceeded by said authorizing.

8. A method of controlling user access over a stateless network to a restricted computing service system which permits simultaneous access by concurrent users, said method including the steps of:

assigning an internal user identification (IUID) to each user;

maintaining a user login map (ULM) which is indicative of the number of current logins for a particular IUID, said login map including a plurality of binary words, with each of said binary words containing a plurality of binary bits, and wherein one or more of said binary bits in the same word are indicative of the number of current logins for a particular IUID;

providing a user mask of binary bits for use with said login map, with the user mask including number and location identifiers about the words in the user login map (ULM) which will be compared with the user mask to determine the number of current logins, said user mask defining the bits in said user login map which indicate the number of current logins for a particular IUID;

comparing said user mask with said login map to determine if a login will be permitted;

authorizing the login if said comparison indicates that the maximum number of logins allowed for that IUID will not be exceeded by said authorizing;

updating the user login map (ULM) when a user login is authorized, said updating resulting in the user login map (ULM) then being indicative of the new number of users presently logged on;

temporarily logging particulars about each session in progress in a state lookup table (SLT), with said particulars including at least a session ID, the starting time of the session, the IUID used to authorize the session, and any ending time established for the session; and

establishing, when the maximum number is logged on, a time-out time for a current session and recording that time in said state lookup table.



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(19) **United States**(12) **Patent Application Publication**
Kitamura(10) **Pub. No.: US 2002/0010630 A1**(43) **Pub. Date: Jan. 24, 2002**(54) **INFORMATION PROVIDING SYSTEM AND
METHOD THEREOF****Publication Classification**(75) **Inventor: Nobuhiko Kitamura, Oomiya-shi (JP)**(51) **Int. Cl.⁷ G06F 17/60**(52) **U.S. Cl. 705/14**

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OLIFF & BERRIDGE, PLC**P.O. BOX 19928****ALEXANDRIA, VA 22320 (US)**(73) **Assignee: TOYOTA JIDOSHA KABUSHIKI
KAISHA, Toyota-shi (JP)**(57) **ABSTRACT**

An advertisement provider transmits advertising data to, for example, a WWW (World Wide Web) server from a terminal and the WWW server transmits the advertising data to a user terminal through a communication network such as the Internet. Advertisement charges to the advertisement provider are changed according to transmitting time period, and charges to the user are changed according to the transmitting time period. The advertisement charges or the user charges may be increased or decreased according to the number of accesses.

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This disclosures of Japanese Patent Applications No. **2000-220241** filed on Jul. **21, 2000** and **2001-118289** filed on Apr. **17, 2001**, including the specifications and abstracts are incorporated herein by reference in their entirety.

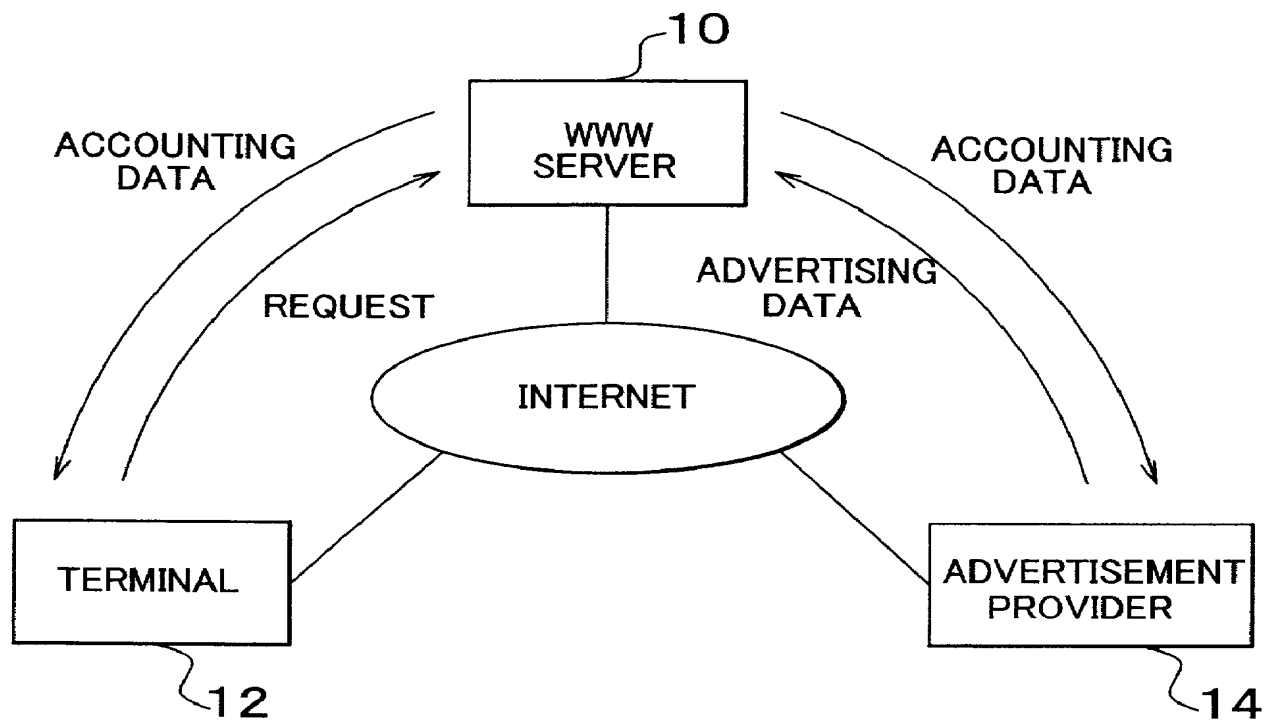


FIG. 1

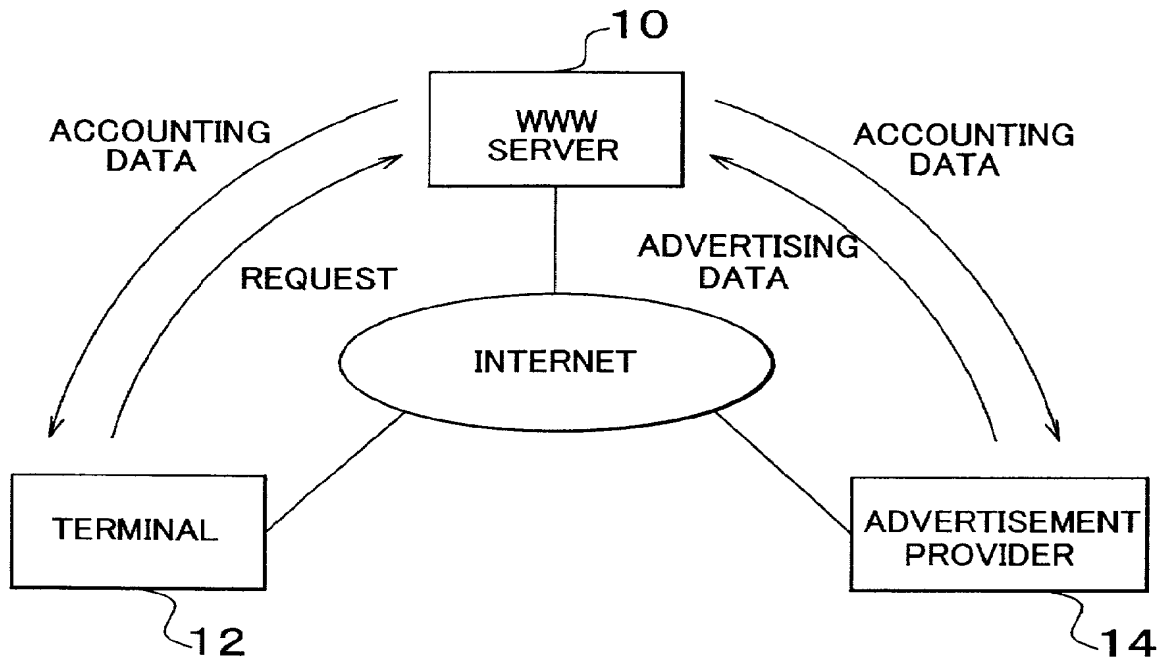


FIG. 2

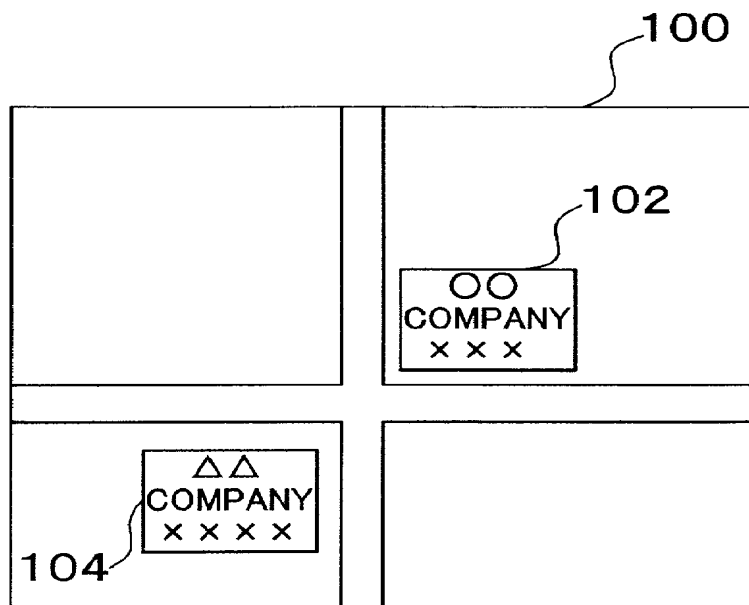


FIG. 3

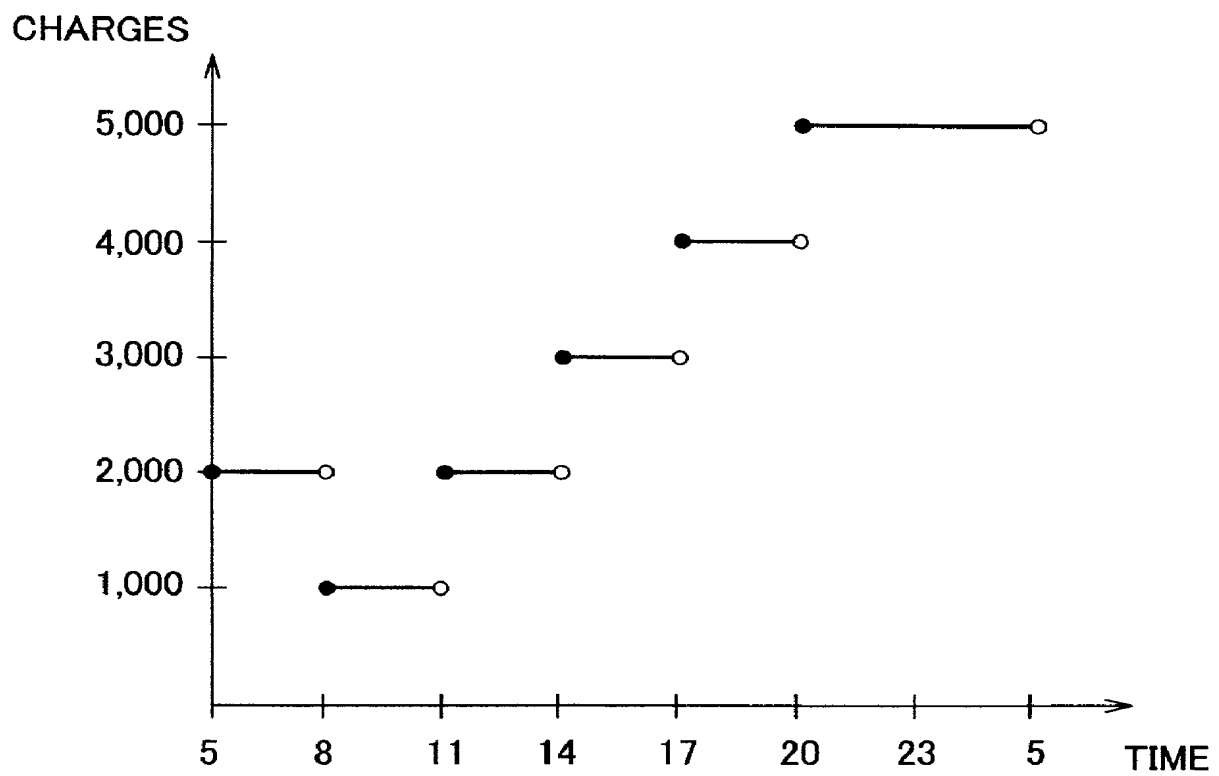


FIG. 4

	weekday	early morning (5-8)	morning (8-11)	noon (11-14)	afternoon (14-17)	evening (17-20)	night (20-23)	late night (23-5)
shinjuku- ward	kabukicho	2000	1000	2000	3000	4000	5000	5000
	nishishinju ku	1000	2000	4000	3000	4000	3000	1000
	toyama	1000	1500	2000	2000	1500	1000	1000
	.							
	.							
shibuya- ward	.							
	dogenzaka	1000	2000	3000	3000	4000	4000	3000
	udagawa	1000	2000	3000	3000	2000	2000	1000
	jingucho	1000	2000	3000	3000	3000	2000	1000
	hiroo	1500	2000	2500	2500	3000	3000	2000
chiyoda- ward	.							
	.							
	marunouchi	500	3000	2500	3000	2500	2500	500
	jinocho	1000	2500	3000	3000	2500	2500	1000
	uchikanda	500	1500	2500	3000	2500	2000	1000
	.							
	.							
	.							

FIG. 5

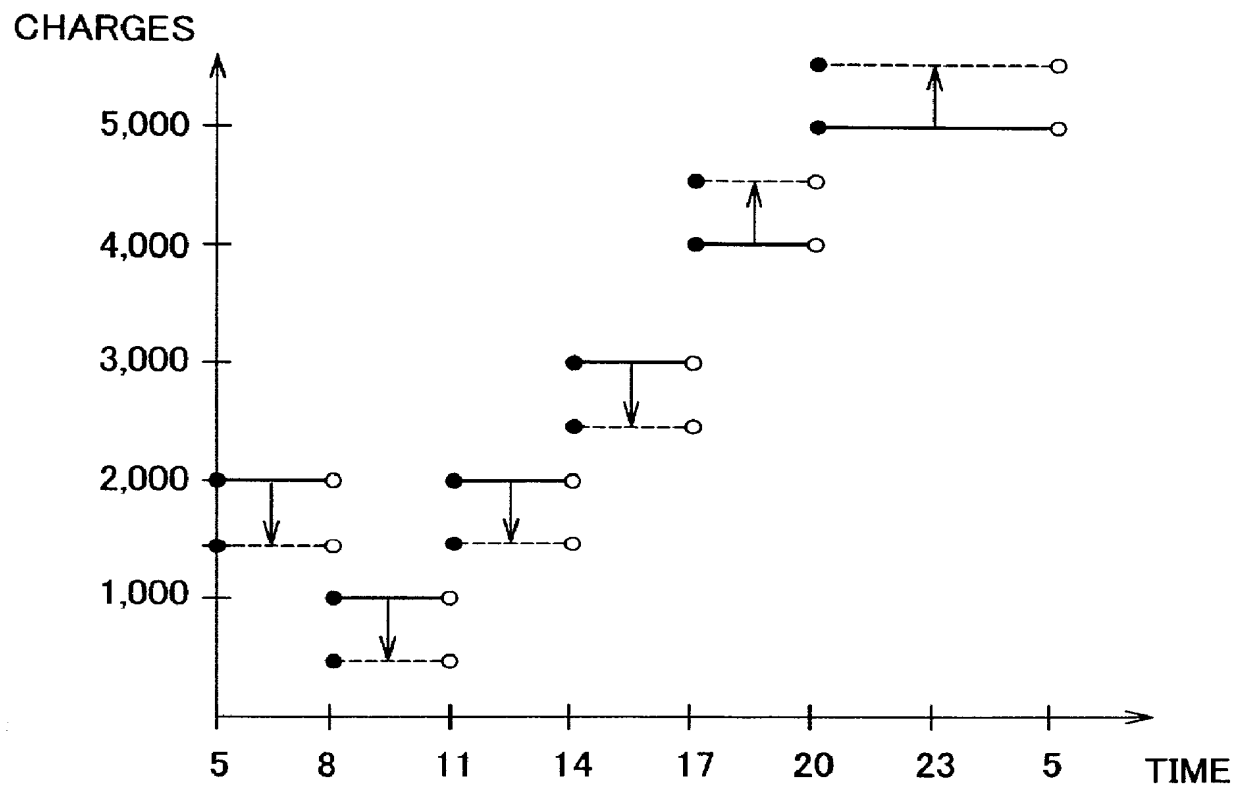


FIG. 6A

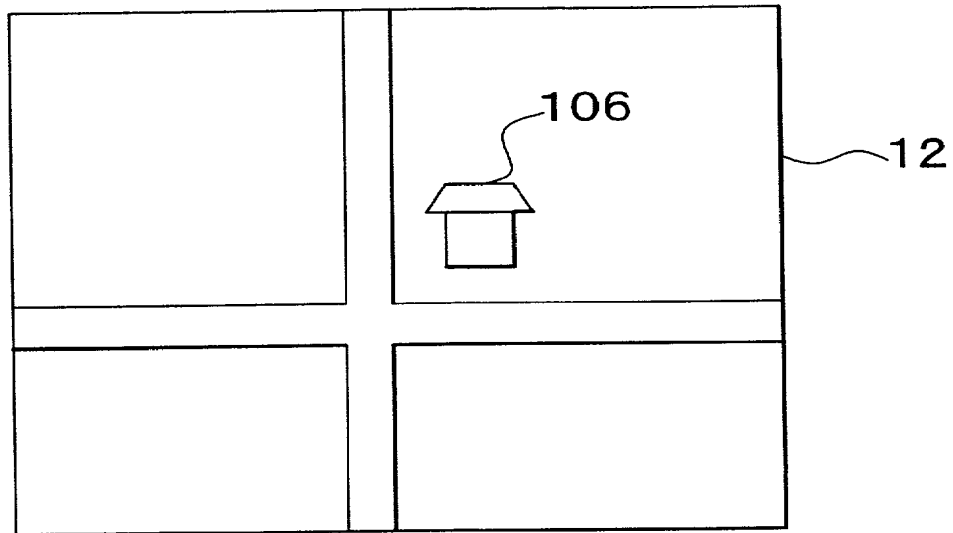


FIG. 6B

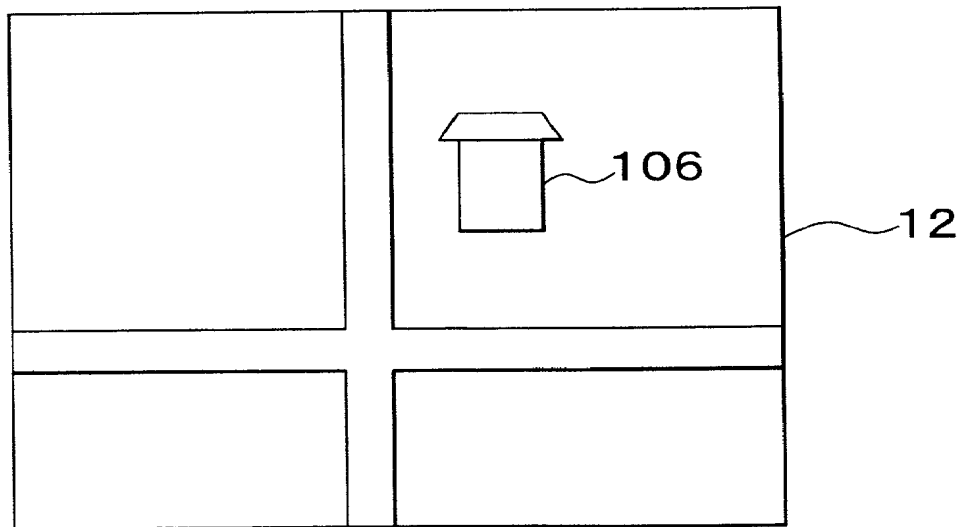


FIG. 7

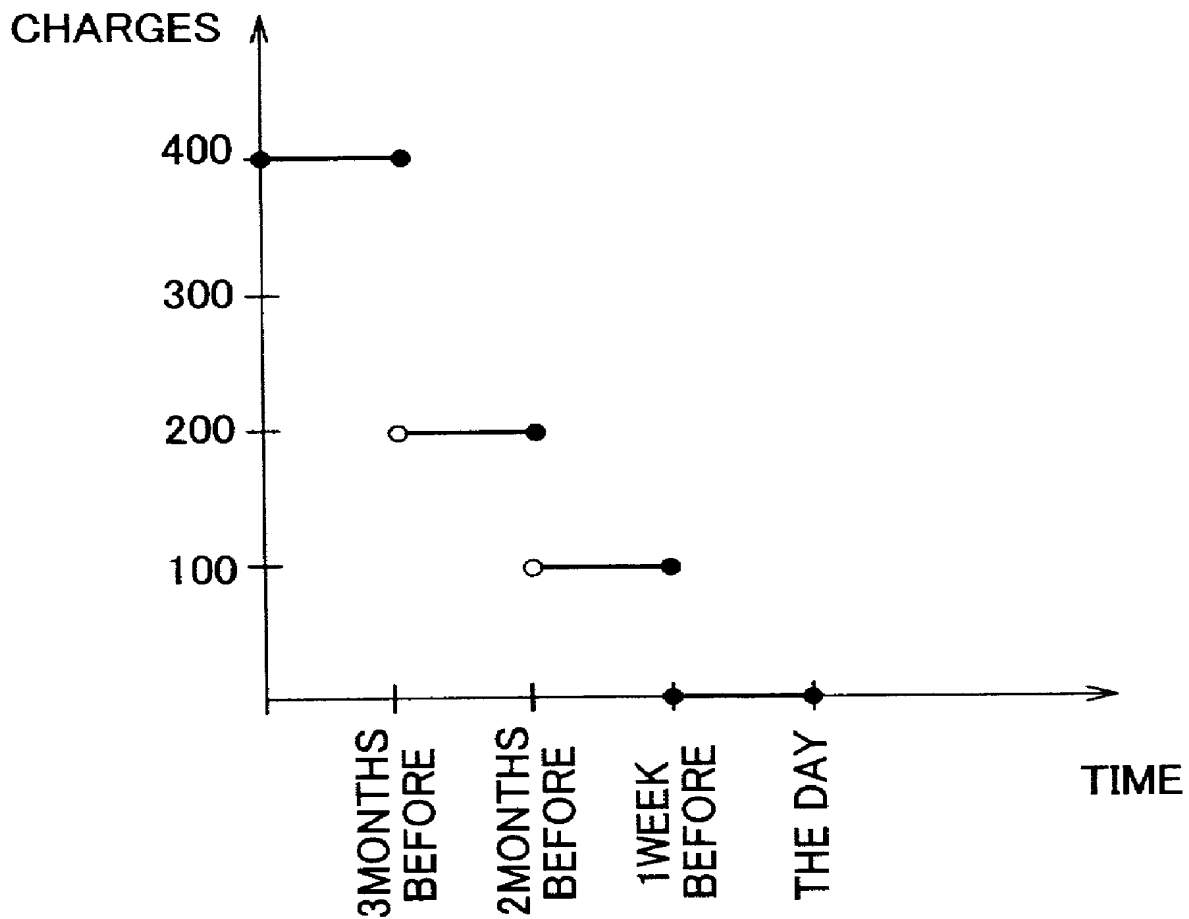


FIG. 8

TICKET PURCHASING INFORMATION	PLAY MUSICAL	3 MONTHS BEFORE	UNTIL 2 MONTH BEFORE	UNTIL 1 WEEK BEFORE	UNTIL THE DAY
		500 YEN/ACCESS	200 YEN/ACCESS	100 YEN/ACCESS	FREE
	SPORTS	1 MONTH BEFORE	UNTIL 1 WEEK BEFORE	UNTIL 6 HOURS BEFORE ON THE DAY	FOR 6 HOURS BEFORE ON THE DAY
		500 YEN/ACCESS	200 YEN/ACCESS	100 YEN/ACCESS	FREE
BARGAIN INFORMATION	UNTIL THE PREVIOUS DAY	UNTIL 10 ON THE DAY	10~14	14~17	AFTER 17
	300 YEN/ACCESS	250 YEN/ACCESS	150 YEN/ACCESS	100 YEN/ACCESS	FREE
INFORMATION OF INFORMATION		UNTIL 1 WEEK BEFORE THE SELLING DAY	FOR 1 WEEK BEFORE THE SELLING DAY		
		100 YEN/ACCESS	50 YEN/ACCESS		

FIG. 9

THE NUMBER OF USER ACCESES	10 THOUSAND PV	10-20 THOUSAND PV	20-30 THOUSAND PV	30-40 THOUSAND PV	MORE THAN 40 THOUSAND PV
DISCOUNT RATE	3 % DISCOUNT	5 % DISCOUNT	7 % DISCOUNT	10 % DISCOUNT	15 % DISCOUNT
CHARGES TO BE BILLED AFTER DISCOUNT	485 THOUSAND YEN	475 THOUSAND YEN	465 THOUSAND YEN	450 THOUSAND YEN	425 THOUSAND YEN

INFORMATION PROVIDING SYSTEM AND METHOD THEREOF

BACKGROUND OF THE INVENTION

[0001] 1. Field of Invention

[0002] The invention relates to an information providing system and a method thereof, particularly provision of advertising information.

[0003] 2. Description of Related Art

[0004] With advancement of communication infrastructure such as the Internet, technologies for providing advertising information through the Internet have been developed.

[0005] For example, a technology exists for appending advertising information called a banner to a predetermined position on a web page and displaying it on a user terminal.

[0006] Moreover, Japanese Patent Laid-Open Publication No. 11(1999)296540 describes a technology in which map data and advertising information are stored, and when a user designates desired positional information on the map from a terminal, the advertising information corresponding to that position is transmitted to the user terminal. Thereby, it is possible to efficiently provide an advertisement related to an area of the user's interest. Moreover, it is described that a plurality of advertisements corresponding to respective areas are prepared and displayed with altered contents according to a time period.

[0007] However, in a case where an advertisement is placed on a web page, advertisement charges are determined only according to the kind of the placed web page or the term of placing it and a reality that advertising effectiveness differs depending on the time period of transmitting the advertising information to the user has not been reflected. For instance, in a case where the user tends to access a web page regarding information of a certain area at night rather than in the day time, it is more effective to provide the banner advertisement placed on the web page at night than in the daytime and it is reasonable to vary the advertisement charges corresponding thereto. However, the advertisement charges have been conventionally fixed and it has been a problem that the operation cannot be effectively carried out for both of an advertisement provider and a web page provider (for example, provider, etc.).

[0008] Moreover, in a case where a fee is charged for advertising information provided to the user because the information is considered an important service for the user, it has been known that the value of the advertising information varies depending on the time when it is provided to the user; however, conventionally, such variation of the value has not been reflected in the charges, and more flexible and effective operation is desired.

SUMMARY OF THE INVENTION

[0009] In view of the above mentioned problem, the invention has been accomplished. It is one object of the invention to provide a system and a method capable of collecting advertising information more efficiently and providing the advertising information to a user efficiently.

[0010] In order to accomplish the above and/or other objects, an information providing system of a first aspect of

the invention comprises a server computer connected to the communication network, transmitting an advertisement through a communication network and varying advertisement charges according to time of transmitting the advertisement. The advertisement charges are varied according to the transmitting time, that is, timing of transmitting the advertising data through the communication network from the server computer instead of fixing the advertisement charges, whereby it is possible to effectively collect the advertising data from an advertisement provider and provide the collected data to the user. The transmission from the server through the communication network may be carried out at the request of the user or without the request of the user.

[0011] The server computer herein preferably transmits the advertising data in which the advertisement charges are varied according to the number of accesses through the communication network. A large number of accesses means that the advertising data can be provided to a great number of users and the value or the effectiveness of the advertisement is high. Thus, the advertisement charges are varied according to the number of accesses, more specifically, the advertisement charges are raised as the number of accesses becomes larger, whereby it is possible to collect the advertising data efficiently.

[0012] Moreover, it is preferable to link the advertising data with map data and change the advertisement charges according to the linked area. By placing the advertising data on the map data, the user can efficiently learn the advertising data of the area in which he or she is interested; however, the value of the advertisement in this area may differ depending on the kind of the advertisement or the like. For example, in a certain area, there is a case where the user wants more information regarding a specific shop, e.g., advertising data related to restaurants. Thus, the advertisement charges change according to the area linked with the advertising data, whereby it is possible to collect and provide the advertising data more efficiently to the user.

[0013] Moreover, the advertisement charges preferably vary according to advertisement space for the advertising data. More specifically, it is desirable to increase the advertisement charges as the advertisement space increases.

[0014] Moreover, the server computer preferably varies the advertisement space according to the number of accesses from the client computer. The number of accesses indicates how much the user is interested, and the advertisement space is varied according to the degree of the user's interest, more specifically, the advertisement space is enhanced as the number of accesses increases, whereby the advertising data can be more effectively provided to the user and the user can easily obtain the advertising data.

[0015] Moreover, an information providing system according to a second aspect of the invention comprises a first computer connected to a communication network and a server computer which transmits advertising data to the first computer at the request of the first computer and sends the first computer accounting data according to the transmitting time of the advertising data to the first computer. Charges are varied according to the transmitting time of the advertising data to the user, that is, timing of transmitting from the server computer at the request of the user, whereby the advertising data can be effectively provided to the user.

[0016] In the server computer herein the accounting data is preferably varied according to the number of requests from the first computer. As the number of the requests (the number of accesses) from the user increases, the advertising data attracts more interest and becomes valuable as information; therefore, the advertisement can be economically provided by varying charges according to the number of the requests.

[0017] Moreover, in an information providing method according to a third aspect of the invention, an advertisement charge table set according to time of providing the advertising data is provided, the advertising data is received based on the advertisement charge table, and the received advertising data is provided through the communication network.

[0018] The advertisement charges set according to the providing time rather than the fixed advertisement charge enable to efficiently collect the advertising data. Incidentally, the advertisement charge table may be stored in the computer as electronic data or may be corporealized as a visible medium, for example, paper.

[0019] Moreover, the advertisement charge table is preferably set according to the providing time and the number of accesses.

[0020] In addition, the advertisement charge table may be set according to the area for which the advertising data is placed.

[0021] Moreover, in an information providing method according to a fourth aspect of the invention, a request of transmitting advertising data is received through a communication network, the advertising data is transmitted to a computer requesting the transmission through the communication network, and the accounting data is transmitted to the one requesting for the transmission based on an accounting table set according to time of providing the advertising data.

[0022] There is an economical advantage for both of an advertisement provider and the user by charges set according to the time of providing instead of a fixed rate. Incidentally, the charge table may be stored in a computer as electronic data, and suitably presented to the user.

[0023] Moreover, the charge table is preferably set according to a number of requests for transmission.

[0024] Incidentally, the communication network in the invention may be either fixed-line or wireless and may be either public circuit or private circuit.

[0025] A server computer of a first aspect of the invention provides an information to a first computer through a communication network. The server computer comprises a memory that stores an advertisement data and a controller that transmits the advertisement data to the first computer through the communication network. The server computer sets an advertisement for transmitting the advertisement data which is charged to provider who provides the advertisement data, and sets the advertisement rate according to a transmitting time of the advertisement data. The advertisement charges are varied according to the transmitting time, that is, timing of transmitting the advertising data through the communication network from the server computer instead of fixing the advertisement charges, whereby it is

possible to effectively collect the advertising data from an advertisement provider and provide the collected data to the user.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] The invention will be described in conjunction with the following drawings in which like reference numerals designate like elements and wherein:

[0027] FIG. 1 is a schematic view of the system of an embodiment of the invention;

[0028] FIG. 2 is an explanatory view showing a display screen of map and advertising data;

[0029] FIG. 3 is a diagram showing a relationship between time and advertisement charges;

[0030] FIG. 4 is a table showing another relationship of time, area, and advertisement charges;

[0031] FIG. 5 is a diagram showing a relationship of time, the number of accesses, and advertisement charges;

[0032] FIG. 6 is an explanatory view showing variation of advertisement space;

[0033] FIG. 7 is a diagram showing a relationship between time and user charges;

[0034] FIG. 8 is a table showing another relationship between time and user charges; and

[0035] FIG. 9 is a table showing a relationship between the number of accesses and placing charges of web page.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0036] Hereinafter, an embodiment of the invention will be explained based on the drawings.

[0037] FIG. 1 shows a schematic view of a system according to an embodiment of the invention. A WWW (World Wide Web) server 10, a user terminal 12 and an advertisement provider terminal 14 are connected to each other through a communication network such as the Internet. Advertising data supplied from the advertisement provider besides map data is stored in the WWW server 10. The advertising data which is linked with a specific area in the map data is stored and the advertisement provider may designate the data to be linked with an area. The map data and the advertising data are written for example in HTML (Hypertext Markup Language) and stored in web page format. As a method for linking an area in the map data with the advertising data, a method in which the advertising data is laid together on the basis of a road map in a montage-like manner may be employed, for instance, with the road map being the first layer, advertising data related to hospitals being the second layer, advertising data related to hotels being the third layer, advertising data related to shops being the fourth layer and advertising data of movies being the fifth layer. As a display form of the advertising data, it is considered that an icon of the facility is indicated and information regarding the facility is displayed besides the icon and so on. Of course, it may be displayed in a banner manner at an arbitrary position on a web page. A URL (Universal Resource Locator) address is uniquely assigned to a web page of the map data to which the advertising data

is appended, and the corresponding web page is transmitted to the user terminal 12 from the WWW server 10 at the request of the user terminal 12 with HTTP (Hypertext Transfer Protocol) protocol.

[0038] Although the advertising data stored in the WWW server 10 is supplied through the communication network from the advertisement provider terminal 14, it may be supplied "on-line" without going through the communication network. In a case where the advertising data is received from the advertisement provider, the WWW server 10 receives the advertising data based on advertisement charges set according to transmitting time of the advertising data to the user terminal 12. That is, the advertisement charges of the advertising data placed on the web page differ depending on the transmitting time in this embodiment. In other words, it can be said that lease charges for giving advertisement space for a web page on lease to the advertisement provider vary depending on the lease timing. After transmission of the advertising data is completed, or at predetermined timing during the term of advertising, the WWW server 10 transmits accounting data to the advertisement provider or the advertisement provider terminal 14. In the accounting data the calculation is based on the transmitting time (or time period) of the advertising data.

[0039] Moreover, the user may receive a desirable web page from the WWW server 10 by operating the user terminal 12, display on the terminal with a web browser or the like, and view the advertising data regarding a specific area.

[0040] FIG. 2 shows an example of map data and advertisements related to an area which are displayed on the user terminal 12. Advertisements 102, 104 are displayed with icons of shops or the like in a map screen 100. The advertisements may be displayed when the user clicks the icons.

[0041] In a case where the advertisement provider or the WWW server side wishes, a fee may be charged for advertising data. When the user displays the pay advertising data on the terminal 12, the WWW server 10 transmits the accounting data to the user terminal 12. This accounting data is also set according to the transmitting time of the advertising data.

[0042] FIG. 3 shows examples of advertisement charges in receiving the advertising data from the advertisement provider. In the diagram, the horizontal axis is transmitting time (or time period) of the advertising data to the user terminal 12, plotted for 24 hours of 5-12-0-5. The vertical axis is advertisement charges. The diagram shows 2000 yen from 5 to 8, 1000 yen from 8 to 11, 2000 yen from 11 to 14, 3000 yen from 14 to 17, 4000 yen from 17 to 20, and 5000 yen from 20 to 5 are charged, respectively. The advertisement provider can easily judge which time period the advertising data is efficiently provided in view of the system of advertisement charges. The relationship between time and the advertisement charges in FIG. 3 is stored as a table in the WWW server 10 and it is preferable that the advertisement provider can suitably refer to it with the terminal 14. Moreover, in a case where the advertising data is supplied from the advertisement provider, the WWW server 10 may calculate the advertisement charges from the transmitting time of the advertising data to the user terminal and the stored table and transmit it to the advertisement provider. Of

course, the side of the WWW server may hold and suitably show the table showing the relationship between the time and the advertisement charges as shown in FIG. 3 in a visible form (for example on paper or on a screen) and receive the advertising data.

[0043] FIG. 4 shows another example of advertisement charges when advertising data is received from the advertisement provider. In this example, the advertisement charges change according to time (or time period) and they also vary depending on the area related to the advertising data, that is the area for which the advertising data is placed. For example, while 500 yen from 5 to 8 and 3000 yen from 8 to 11 are respectively charged for advertising data placed for Marunouchi, Chiyodaward, they vary to 1000 yen from 5 to 8 and 2500 yen from 8 to 11 for advertising data placed for Jinbocho, Chiyoda-ward. Thus, the advertisement charges are changed according to the area, whereby the advertising data can be received more efficiently.

[0044] FIG. 5 shows still another example of advertisement charge when advertising data is received from the advertisement provider. In this example, the advertisement charges change according to time (or time period) and also depending on the number of accesses to the advertising data from the user. The number of accesses can be counted by an access counter within the WWW server 10, and the advertisement charges are changed based on the counting results. As a method for changing, for example, a lower threshold and an upper threshold are set and in a case where the number of accesses from the user does not reach the lower threshold, basic charges (the basic charges are to be the advertisement charges shown in FIG. 3) are reduced by 500 yen. On the contrary, in a case where the number of accesses from the user exceeds the upper threshold, the basic charges are raised by 500 yen, and so on.

[0045] In FIG. 5, the basic advertisement charges are shown by solid lines and the advertisement charges after being changed according to the number of accesses are shown by the dotted lines. The charge of 2000 yen is reduced to 1500 yen from 5 to 8 and the charge of 1000 yen is reduced to 500 yen from 8 to 11. Moreover, the charge of 2000 yen is reduced to 1500 yen from 11 to 14 and the charge of 3000 yen is lowered to 2500 yen from 14 to 17. On the other hand, the charge of 4000 yen is raised to 4500 yen from 17 to 20 and the charge of 5000 yen is raised to 5500 yen from 20 to 5.

[0046] In general, the basic charges are set to the most suitable amounts by statistically processing the number of accesses in the past, user's taste and so on; however, there may be a case where the basic charges are not always reasonable with the passage of time. Therefore, increase and decrease of the advertisement charges are adjusted according to the number of accesses, whereby more suitable advertisement charges can be set, which are efficient for both the advertisement provider and the side of the WWW server.

[0047] Incidentally, for example, in a case where the advertising data from the advertisement provider is displayed in banner format at an arbitrary position of a web page, if contents of the web page where the advertising data is placed are good, more users tend to access the web page; therefore, the number of accesses to the advertisement also increases. That is, the number of accesses to the advertising data influences the contents of the web page. Accordingly, in

a case where accounting data in which the advertisement charges increase as the number of accesses increases is created, for a provider of the web page where the advertising data is placed, the accounting data in which placing charges of the web page (advertisement charges of the web page) are lowered according to the number of accesses is created and transmitted to the web page provider.

[0048] In FIG. 9 such an example of the accounting data to the web page provider according to the number of accesses is shown. In FIG. 9, in a case of the number of user accesses being 10 thousand PV (page view), 3% of discount is applied corresponding to the increase rate of the advertisement charges to the advertisement provider, and in a case of the number of user accesses being 40 thousand PV, 15% of discount is similarly applied corresponding to the increase rate of the advertisement charges to the advertisement provider. Suppose that the basic charges for placing a web page for one week are 500 thousand yen, web page placing charges amount to 485 thousand yen in the case of the number of user accesses being 10 thousand PV in the WWW server 10 and the web page placing charges become 425 thousand yen in the case of more than 40 thousand PV. In FIG. 9, discount rates of the advertisement charges in the number of user accesses other than those are shown. Thus, by adjusting the web page placing charges according to the number of accesses, an incentive to create better contents is given to the web page provider.

[0049] Incidentally, it is preferable to change the increase and decrease of the advertisement charges according to the number of accesses, and also to change advertisement space on a web screen according to the number of accesses. The great number of user accesses means that interest of the user is high to that extent. Therefore, an outstanding display of the advertisement within the page is an advantage for both the advertisement provider and the user.

[0050] FIG. 6A and FIG. 6B show examples of screens displayed at the user terminal 12 when advertisement space is changed according to the number of accesses. FIG. 6A shows an example of screen in the initial state with an icon 106 of an advertisement in a standard size. Moreover, FIG. 6B shows an example of screen when the number of accesses from the user exceeds the upper threshold, the icon 106 of the advertisement which is magnified compared to that of FIG. 6A is displayed. Thereby, the advertisement provider is able to appeal one's advertisement to the user, and also the user can easily view the advertisement of interest within the page. Incidentally, it is possible to increase the advertisement space relative to the number of accesses. When the advertisement charges are changed according to the number of accesses, the advertisement charges can be calculated on the basis of the advertisement space changed according to the number of accesses. Specifically, for example, the original advertisement space is doubled in a case where the number of accesses exceeds the upper threshold, and the advertisement charges are increased by 50% by doubling the advertisement space and so on.

[0051] FIG. 7 shows an amount charged to the user terminal 12 by the WWW server 10 in a case where the user requests a desirable web page from the WWW server 10 and views an advertisement. Examples to be considered as being billable are shop information tied up with information magazines, event information tied up with shops, part-time

job information, real estate information, auction participation, and bidding system (for example, a system enabling a user to make a reservation of a desired hotel in which a user presents a condition of staying at a late-night hotel at a cost of less than 10000 yen and an advertisement providing hotel nearby suggests a room meeting this condition).

[0052] As shown in FIG. 7, data for which a fee is charged to the user also changes according to transmitting time of the advertising data to the user. There is a case in which the value of information is lowered with the passage of time; for example, the earlier sales information of a certain shop is, the more valuable it is for the user (if the information is obtained in the middle of the sales, there may be a case that a good of interest has been sold out). Thus, for example, 400 yen is charged three months before an event or the like, 200 yen, 100 yen are charged for 3-2 months before and 2 months to 1 week before, respectively, and it costs nothing for one week before to the date. Thus, the charges are lowered with the passage of time, whereby what the advertisement provider (the seller) wants to sell, for example, sports, plays, musicals, tickets of concerts, reservation of vacant rooms of a late-night hotel, and so on, can be positively sold. Moreover, it is an advantage for the user who wants information at the lowest cost possible.

[0053] FIG. 8 shows another example of the accounting data transmitted to the user terminal 12. The WWW server 10 where such a table is stored calculates charges from the kind of advertising data requested by the user and time of the request (that is the transmitting time of the advertising data to the user terminal 12) based on the table and transmits it to the user terminal 12 as the accounting data. As kinds of advertising data, there are ticket purchasing information, bargain (sales) information, information of information magazines and so on. For example, as to the bargain information, charges are 300 yen/access (300 yen per one access) for the previous day, 250 yen/access until 10 of the day, 150 yen/access until 14 of the day, 100 yen/access until 17 of the day, and free after 17 o'clock of the day. Of course, in the drawing, it is also preferable to adjust increase and decrease of the basic charges according to the number of accesses.

[0054] While an embodiment of the present invention has been described, the invention is not limited to this embodiment, and various changes may be made thereto. For example, in the embodiment, a computer is depicted as the user terminal 12; however, it may be an arbitrary apparatus, may be PDA (Personal Digital Assistant) or a portable phone as long as it is capable of receiving the transmitted advertisement.

[0055] Moreover, the user terminal 12 may be installed to a vehicle and advertising data may be displayed on a screen, for example, of a vehicle navigation system. In such a case, the advertising data is transmitted to a terminal of each vehicle from an information center of the navigation system.

[0056] As explained in the foregoing, in the present invention advertisement charges or charges billed to the user are not fixed, but vary according to time; therefore, it is possible to efficiently collect the advertising data and provide the same to the user.

[0057] In the illustrated embodiment, the server computer 10 is implemented as a programmed general purpose com-

puter. It will be appreciated by those skilled in the art that the controller can be implemented using a single special purpose integrated circuit (e.g., ASIC) having a main or central processor section for overall, system-level control, and separate sections dedicated to performing various different specific computations, functions and other processes under control of the central processor section. The controller can be a plurality of separate dedicated or programmable integrated or other electronic circuits or devices (e.g., hardwired electronic or logic circuits such as discrete element circuits, or programmable logic devices such as PLDs, PLAs, PALs or the like). The controller can be implemented using a suitably programmed general purpose computer, e.g., a microprocessor, microcontroller or other processor device (CPU or MPU), either alone or in conjunction with one or more peripheral (e.g., integrated circuit) data and signal processing devices. In general, any device or assembly of devices on which a finite state machine capable of implementing the procedures described herein can be used as the controller. A distributed processing architecture can be used for maximum data/signal processing capability and speed.

[0058] While the invention has been described with reference to preferred embodiments thereof, it is to be understood that the invention is not limited to the preferred embodiments or constructions. To the contrary, the invention is intended to cover various modifications and equivalent arrangements. In addition, while the various elements of the preferred embodiments are shown in various combinations and configurations, which are exemplary, other combinations and configurations, including more, less or only a single element, are also within the spirit and scope of the invention.

What is claimed is:

1. An information providing system comprising:
 - a server computer capable of transmitting an advertisement data through a communication network; wherein an advertising rate for transmitting the advertisement data is charged to a provider who provides the advertisement data to the server computer, and the advertising rate varies according to a transmitting time of the advertisement data.
2. The system according to claim 1, wherein the advertising rate varies according to a number of accesses to the advertising data through the communication network.
3. The system according to claim 2 wherein the advertising data is displayed on a web page, a placing charge for placing contents on the web page is charged to the provider who provides the contents to the server computer, and the advertising rate is raised as the number of accesses increases, and the placing charge is lowered as the number of accesses increases.
4. The system according to claim 1 wherein the advertising data is displayed on a web page, and the advertising rate varies according to an advertisement space on the web page.
5. The system according to claim 4 wherein the server computer changes the advertisement space according to a number of accesses to the advertising data through the communication network.
6. The system according to claim 1 wherein the advertising rate varies according to a location for which the advertising data is provided.

7. An information providing system comprising:

- a server computer connected to a communication network and transmitting advertising data to a first computer at the request of the first computer and sending the first computer accounting data according to transmitting time of the advertising data to the first computer.

8. The system according to claim 7 wherein the server computer changes the accounting data according to a number of requests for transmitting the advertising data.

9. An information providing method comprising:

- receiving advertising data from an advertisement provider, providing the advertising data through a communication network, and setting an advertising rate charged to the advertisement provider according to a providing time of the advertising data through the communication network.

10. The method according to claim 9 wherein the advertising rate is set according to the providing time and a number of accesses of the advertising data through the communication network.

11. The method according to claim 9 wherein the advertising rate is set according to an area for which the advertising data is provided.

12. The method according to claim 9 further comprising:

- displaying the received advertising data on the web page, increasing the advertising rate charged to the advertisement provider as a number of accesses of the advertising data through the communication network increases, and lowering a displaying charge charged to the advertisement provider as the number of accesses increases.

13. An information providing method comprising:

- providing an advertising rate table set according to a providing time of advertising data, receiving the advertising data at an advertising rate set based on the advertisement rate table, and providing the received advertising data through a communication network.

14. An information providing method comprising:

- receiving a request for transmitting advertising data through a communication network and transmitting the advertising data to a computer requesting for the transmission through the communication network, and sending accounting data set according to a providing time to the computer requesting the transmission.

15. The method according to claim 14, wherein the accounting data is set according to a number of requests for the transmission.

16. A server computer providing an information to a first computer through a communication network, comprising:

- a memory that stores an advertisement data; and

- a controller that transmits the advertisement data to the first computer through the communication network, and sets an advertisement rate for transmitting the advertisement data which is charged to a provider who provides the advertisement data, wherein the controller sets the advertisement rate according to a transmitting time of the advertisement data.

17. The server computer according to claim 16, wherein the controller sets the advertisement rate according to a number of accesses to the advertising data through the communication network.

18. The server computer according to claim 17, wherein the advertisement data is displayed on a web page, and the controller sets a placing charge for placing contents on the web page which is charged to the provider who provides the contents of the web page, and the controller raises the advertisement rate as the number of accesses increases, and lowers the placing charge as the number of accesses increases.

19. The sever computer according to claim 16, wherein the controller sets the advertisement rate according to a location for which the advertisement data is provided.

20. The server computer according to claim 16, wherein the controller sets an advertisement space displaying the advertising data according to a number of accesses to the advertising data from the first computer.

* * * * *